

Frustrated fisher: geese and tilapias spoil bait-fishing by the Green Heron (*Butorides striata*) in an urban park in Southeastern Brazil

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Recebido em 28 de maio de 2007; aceito em 18 de novembro de 2007.

RESUMO: Pescador frustrado: gansos e tilápias prejudicam pesca com isca do socozinho (*Butorides striata*) num parque urbano no sudeste do Brasil. O uso de iscas para atrair pequenos peixes é uma das táticas de pesca usadas pelo socozinho (*Butorides striata*). Apresento aqui a atividade de pesca desta pequena garça, com isca de pão, frustrada por gansos e tilápias num parque urbano no Sudeste do Brasil. O socozinho foi registrado usando isca somente quando os gansos eram alimentados por visitantes, especialmente em finais de semana. A aproximação destas aves maiores à isca era repelida pelo socozinho, porém fora do alcance do seu bico a isca era comida por gansos ou tilápias. Após perder uma isca, o socozinho apanhava nova porção, geralmente mudando de local de pesca. Depois de terminada a oferta de iscas, a ave se afastava e adotava a tática de espreita na vegetação marginal ou repousava em ramos a cerca de 4-5 m acima do chão. O presente registro indica que o socozinho percebe a agregação ruidosa dos gansos como oportunidade para uso de iscas, repele as aves que se aproximam das iscas, muda de locais de pesca e repete a tática de iscar até a oferta de pão terminar.

PALAVRAS-CHAVE: Tática de pesca, uso de isca, ajustes comportamentais, ambientes urbanizados.

KEY-WORDS: Fishing tactic, bait use, behavioural adjustments, urbanised habitats.

Use of bait to attract small fishes is a remarkable foraging tactic of the Green or Green-backed Heron (*Butorides striata*), recorded in North and South America, Africa, and Asia (Sisson 1974, Burton 1985, Higuchi 1986, Davis and Kushlan 1994, Willis and Oniki 2003). Bait types include fish pellets, bread pieces, leaves, twigs, feathers, insects, and even plastic foam, this fishing tactic being regarded as tool-use (e.g., Boswall 1983, Higuchi 1986, Davis and Kushlan 1994).

I describe here failures to bait-fish by the Green Heron, as frustrated by waterfowl and large fish in an urban park in Southeastern Brazil. I describe how the heron persisted in bait-fishing, and how it behaved after repeated failures due to interference of the larger competitors for its bait. Additionally, I suggest that the heron perceives the waterfowl aggregation as an opportunity for bait-fishing.

The records were made at the urban reserve "Parque Ecológico Prof. Hermógenes F Leitão Filho" (22°48.615'S, 47°04.504'W), Campinas, São Paulo state, southeastern Brazil. This is a public park with a pond bordered by a sandy path used by people for walking, running, and promenading. The pond harbours several species of native water birds, as well as domestic breeds of the Greylag Geese (*Anser anser*) and Muscovy Ducks (*Cairina moschata*). Two small railed pavements bordering a bridge near the pond's drain were used by people promenading in the park with their children to attract the domestic waterfowl with bread pieces thrown in the water. These "feeding sessions" took place especially on weekends and holidays, less often on working days. The bread also attracted two fish species, the tilapia *Tilapia rendalli* (Cichlidae) and the guppy *Poecilia reticulata* (Poeciliidae). The former attains 45 cm in

total length, whereas the latter attains 5 cm (females) and 3 cm (males) (Froese and Pauly 2007, IS pers. obs.). Smaller pieces of bread were used by the heron to bait guppies. Besides observations on the heron's frustrated bait-fishing, I examined the possibility that the noisy geese aggregations might be used as a cue by the heron to obtain bread for baiting. Thus, I conducted a series of four simple tests, each of them performed five times. On non-consecutive working days I attracted a group of geese that was grazing, or engaged in other activity away from the pavement, to their usual feeding place under the bridge. To do so I threw bread pieces over the path while walking, thus guiding the birds with a technique modified from Browning (1888). Once the geese were in place I threw bread pieces into the water. I also threw bread pieces or small stones into the water in absence of geese near the pavement area. In the final trial set I made movement with the arm as if I were throwing something in the water. Each trial was performed when the heron was not recorded on the bank near the pavement. Baiting sequences, from the heron finding and taking the bait to losing it to waterfowl, large fish, or water flow, as well as the heron's fishing success (if any), were observed with naked eye or through a telescopic 70-300 mm photographic camera lens at a distance of 2-5 m. Observational sessions lasted 10-45 min, totalling 1045 min over nine mornings and two afternoons in May 2007. "Ad libitum" and "behaviour" sampling rules (Martin and Bateson 1986) were used throughout. A large series of digital photographs was taken as vouchers, a few of the most representative presented here.

The Green Heron was recorded bait-fishing every time the waterfowl aggregated near the railed pavement and fed on

bread pieces (N = 29). The heron took smaller bread pieces that were on the bank or floated nearby. After securing a suitable bread piece, the heron walked to a given place and put or threw (Figure 1) the bait afloat on the water. Due to small waves formed in windy days and/or made by the feeding movements of waterfowl and large tilapias, the bread piece usually bobbed on the water surface and moved towards the lake's drain. While still within the heron's reach, it retrieved

the bread with its bill and repositioned the bait on a spot where it could be monitored. The bread piece was usually noticed by the alert geese, at which occasion the heron stabbed forwards, its mandibles open and head and neck feathers erected, successfully driving the larger bird away. However, when two or more geese harassed the heron (Figure 2), it was unable to hold position and lost the bait. The geese even stalked the heron while it was walking along the bank and still holding the bread



FIGURES 1-6. (1) The Green Heron (*Butorides striata*) throws a bread piece in the water to use as bait; (2) a confrontation between three geese and the heron, the lesser bird ready to pounce – note open mandibles of both the geese and the heron and feathers erected on the head and neck of the latter; (3) the heron repositions the bait carefully on the water surface; (4) only to lose it immediately afterwards to a large tilapia – note commotion on the water surface; (5) the heron seeks a secluded site between concrete pieces to resume bait-fishing – note heron's head between two pieces; (6) the heron holds in its bill a guppy female successfully attracted to the bread bait – note bait afloat near the heron's bill (at the left on the figure).

in the bill. When the bread piece moved slightly beyond the heron's reach and thus the bird had no chance to retrieve it, the bait was generally lost to a goose, a duck, or a large tilapia. On several occasions the heron was repositioning the bread (Figure 3) when a tilapia suddenly took the bait (Figure 4). As the large fish surfaced and took the bread, they caused commotion in the water and the heron retreated a little. After repeatedly losing the bait at the same place, the heron changed foraging site, mostly a secluded spot. For two days in a row, the heron sought a secluded spot only after repeatedly losing the bait. However, on the third day it took a bread piece and immediately chose a secluded spot for bait-fishing. These spots usually were close to the lake's drain or between pieces of concrete slabs (Figure 5) and yielded very few or no fish. Additionally, the heron was recorded retrieving the bread piece and retreating higher on the bank until its fishing site was "waterfowl-free", when it resumed baiting. The heron proceeded with its bait-fishing until no bread piece was available, when it flew off. From a total of 47 recorded bait-fishing rounds, the heron lost the bait to the waterfowl, tilapias, or water flow 43 times (91.3%), with only three preys caught. However, the four remainder, timed bait-fishing rounds were notably successful (see below) until the nibbling fish caused the bread to float out of the heron's reach, its frequent retrieving notwithstanding. The bird was recorded using a flat potato chip as bait only once, with no success. Twice it was recorded holding a small insect for minutes while perched on bank vegetation, but I was unable to observe whether it did use this bait type.

When the waterfowl were grazing on grass at the lake bank or otherwise feeding elsewhere, I recorded the heron standing in crouched posture on the bank or on branches overhanging the water, and standing in the water (*cf.* Davis and Kushlan 1994), or walking on branches and standing at one spot and changing it every time it disturbed the water on the previous spot. The heron was recorded fishing about 10-600 m from the bridge, or less often resting perched on a branch at 4-5 m above ground of a tree located about 5 m from the pavement. In the five occasions I attracted the geese to the pavement with bread pieces, the heron landed on the bank within 20-180 sec. Twice I located the heron fishing on the branches of a tree at a small inlet on the left bank about 200 m from the bridge. I immediately went after the geese and attracted them to the pavement where they began their noisy feeding. It lasted 180 and 50 sec respectively to the heron approaching the bridge flying from its former fishing place and landing on the right bank near the geese. In another occasion it approached running on the bank, from within the vegetation where it was hunting about 10 m from the pavement. It took a bread piece and began bait-fishing. When I threw bread from the bridge in absence of the geese and only fish were attracted, the heron landed on the bank only once and left soon afterwards. The heron also did not land on the bank when I threw pebbles or made mock movements with the arm.

When waterfowl and/or tilapias were not interfering with its baiting, the heron could be a remarkably successful guppy

fisher (Figure 6). In four timed fishing rounds (11, 2, 6, and 2 min) it caught 1.66, 2, 1.83, and 2.5 fish·⁻¹min respectively. Twice the heron chose a fishing spot where guppies were already feeding on a bread piece. It then walked slowly on the bank and put its bait carefully afloat and crouched (these were the occasions its fishing yielded the highest scores). While baiting the heron fished mostly for the large guppy females. When the heron was fishing from within the bank vegetation or from a branch above the water surface (2 min timed for each of these fishing tactics), its hunting success was 0.2 and 1 fish·⁻¹min respectively.

Bait type influences the fishing success of the Green Heron in Japan, flies and biscuit pieces being the most successful bait (Higuchi 1986), although the latter was less used than the former (possibly due to lower availability). I regard biscuits and bread to have similar attractiveness to omnivorous fish such as small cyprinids and guppies, the two fish types usually caught by the heron. Baiting with bread is the situation most commonly reported for this heron, presumably due to people throwing this food type to fishes and waterfowl that dwell in urban ponds and lakes, places where several records of bait-fishing are recorded from (*e.g.*, Sisson 1974, Lowell 1958, Higuchi 1986, Davis and Kushlan 1994). Thus, although other bait types were potentially available for the heron reported here (*e.g.*, insects, berries, leaves, feathers) bread was the bait recorded almost exclusively at the observation site.

During the present study, an exceedingly high number of bait-fishing rounds with bread was spoiled by domestic waterfowl whose movements caused the bait to float away from the heron's reach and then they took the bread, and by large tilapias that often stole the bait right from under the bird's bill. Although the heron was able to drive away the avian competitors for bread while the bait was within its reach on most occasions (see Lowell 1958 for similar records), I am unaware of any extreme situation such as that reported here. Even if I was unable to recognise the baiting heron as the same individual, its behaviour (fishing or perching on the same places, arriving shortly after the geese aggregated, and allowing observation at close quarters) indicates that only one individual was under observation. Additionally, Green Herons are highly territorial and feed alone (Martínez-Vilalta and Motis 1992), which lends support to my assumption. Thus, assuming that I observed the same individual, the heron was remarkably persistent in its bait-fishing attempts under such unfavourable circumstances. A likely explanation is that the heron perceived these circumstances (however unfavourable at times) as opportunities to take bread pieces to bait with. Moreover, the guppies were more common near the pavement than elsewhere (*pers. obs.*) and it is possible that the heron perceived this situation as well. Taking a bait to more distant sites, especially on wing, is rarely recorded (*e.g.*, Lowell 1958, Higuchi 1986, *IS pers. obs.*) and this would further explain the persistence of the heron with its frustrated fishing attempts at the same place. Additionally, this place yielded good fishing when the waterfowl retreated. At a site in Costa Rica, herons stayed at a location significantly

longer after a successful attack than after an unsuccessful one (Betts and Betts 1977).

The heron's presence every time the geese were being bread-fed as well as its arrival shortly after I managed to attract the waterfowl to their habitual place strongly indicates that the heron used the noisy aggregation as a cue to potential bread bait availability. Its absence on the bank when I threw bread to fishes and no geese was near the bridge, as well as when I threw pebbles or made mock throws, apparently strengthens the above suggestion. The potential to recognise, and learn from, a new situation is already recorded for the Green Heron (*e.g.*, Lowell 1958, Sisson 1974, Higuchi 1986, Martínez-Vilalta and Motis 1992, Davis and Kushlan 1994) and the observations reported here add to this potential.

ACKNOWLEDGMENTS

I thank my family for supporting love and help, and the CNPq for essential financial support.

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