

Playful birds: cormorants and herons play with objects and practice their skills

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Abstract: Play is a behaviour known mostly for mammals, although birds are recorded to play as well. Here I describe the play behaviour for two bird species, the Neotropical Cormorant (*Phalacrocorax brasilianus*) and the Green Heron (*Butorides striata*) in southeastern Brazil. Juvenile and adult cormorants were recorded to manipulate sticks, leaves, rootlets, and plant debris while on the ground. They also played with sticks, leaves, pods, and plant debris, as well as live or dead fish while in the water, repeatedly grabbing the object and submerging it. When the object was a fish, they tossed it in the air as well. Juvenile herons played with small pieces of wood, fruits, and other floating objects, which they picked up and tossed repeatedly in the water. The behaviours recorded for the cormorants and herons qualify as object play, i.e., frolicsome interactions with an inanimate object including exploratory manipulation. This behaviour is regarded as having an important role in general motor development and for practice of particular skills, mostly foraging and breeding.

Keywords: Aves, *Phalacrocorax brasilianus*, *Butorides striata*, play behaviour, object and social play, motor training.

SAZIMA, I. 2008. **Aves brincalhonas: biguás e garças brincam com objetos e treinam suas habilidades.** Biota Neotrop. 8(2): <http://www.biotaneotropica.org.br/v8n2/pt/abstract?short-communication+bn02508022008>.

Resumo: Brincadeira é um comportamento conhecido principalmente em mamíferos, embora aves também brinquem. Registro aqui atividade lúdica em duas espécies de aves, o biguá (*Phalacrocorax brasilianus*) e o socozinho (*Butorides striata*), no sudeste do Brasil. Biguás jovens e adultos foram registrados manipulando gravetos, raízes, folhas e fragmentos vegetais quando em terra. Também brincavam com gravetos, folhas e fragmentos vegetais, além de peixes, quando na água. Durante o nado, as aves apanhavam e afundavam o objeto repetidamente. Quando o objeto era um peixe, também o jogavam para cima. Socozinhos jovens brincavam com pequenos pedaços de madeira, frutos e objetos flutuantes, que apanhavam e largavam na água repetidamente. Os comportamentos registrados para os biguás e os socozinhos são classificados como brincadeira com objetos, i.e., entretenimento com um objeto inanimado, incluindo manipulação exploratória. Este comportamento é considerado como tendo função importante no desenvolvimento motor e prática de habilidades específicas, principalmente alimentação e reprodução.

Palavras-chave: Aves, *Phalacrocorax brasilianus*, *Butorides striata*, atividade lúdica, treinamento motor.

Introduction

Play is a behaviour known mostly in mammals, although birds play as well (e.g. Ficken 1977, Millar 1981, Burton 1985, see several impressive images in Brown 1994). In general, play is most prevalent among juveniles and may be recognized by some or all of the following characteristics: being repetitive, awkward, or exaggerated; lacking final consummatory acts; being incomplete or in reordered sequences; having no obvious immediate function; being quick and energetically expensive (e.g. Ficken 1977, Millar 1981, Burghardt 1998). Among birds, play is best known in parrots (Psittacidae) (e.g. Collar 1997, Sick 1997) and crows (Corvidae), these latter birds displaying an extraordinary play repertoire (review in Heinrich & Smolker 1998). Additionally, many seabirds and raptors practise hunting and prey-handling with inanimate objects such as twigs, sticks, and bits of moss (e.g. Kitowski 2005, Nelson 2006). However, for cormorants (Phalacrocoracidae) and herons (Ardeidae) play remains mostly unrecorded or is mentioned very briefly (see Poole 2008 for an encyclopaedic treatment of North American birds). For instance, among the six cormorant species that occur in North America play is mentioned en passant for *Phalacrocorax pelagicus* (Hobson 1997) and *P. urile* (Causey 2002). For the 12 heron species that occur in NA, play is briefly noted only for *Ardea herodias* (Butler 1992), *Bubulcus ibis* (Telfair II & Raymond 2006), and *Egretta tricolor* (Frederick 1997).

I report here on play behaviour for the Neotropic Cormorant (*Phalacrocorax brasilianus*) and the Green Heron (*Butorides striata*), two bird species for which play seems unrecorded. Cormorants in general are skilled underwater hunters (e.g. Orta 1992, Nelson 2006) and the Green Heron is known for bait-fishing (e.g. Sisson 1974, Higuchi 1986, Sazima 2007). Thus, I note that for both species play with objects should be expected, as one hypothesised function of this behaviour type is to enable young animals to improve their skills (review in Bekoff & Byers 1998).

Material and Methods

Records of play behaviour in cormorants and herons were made at the urban reserve "Parque Ecológico Prof. Hermógenes F. Leitão Filho" (22° 48.615' S and 47° 04.504' W), Campinas, São Paulo state, southeastern Brazil. The reserve is a public park with a large pond with a perimeter of about 1,700 m bordered by a sandy path and adjacent herbaceous and woody vegetation (Sazima 2007, 2008). For a total of 144 days (about 320 hours) from 20 April 2007 to 28 February 2008 the path was travelled at a constant pace (about 5 km.h⁻¹) in the morning and/or afternoon and all cormorants in view were scanned for activity type. Whenever a cormorant was perceived to initiate play (e.g. repeatedly plunging its head underwater or catching an object), it was observed and/or photographed and the play bout was timed. Cormorants were observed through binoculars and a 300 mm auto-focus telephoto lens at a distance of 5-40 m. Herons were observed at or near the nest from nestlings about one week old to fully fledged juvenal birds (6 October to 5 November 2007) with naked eye and through a 300 mm auto-focus telephoto lens at a distance of 2-5m. Observational sessions totalling about 10 hours concentrated on the period at which the juveniles left the nest and wandered or perched on branches overhanging the lake. "Ad libitum" and "behaviour" sampling rules (Martin & Bateson 1986) were used throughout all observational sessions, as play behaviour is elusive and ephemeral (see Bekoff & Byers 1998). A fortuitous observation of a cormorant playing was recorded at a mangrove stream (23° 25.882' S and 45° 04.185' W) in Ubatuba, São Paulo state on 13 December 2007. A large series of digital photographs was taken as vouchers besides being used for further analyses, description, and illustration of the

play behaviour types. Development stages of playing birds were assessed by their plumages and colour of bare parts. Colour pictures in Harrison (1985) and descriptions in Telfair & Morrison (2005) were used to assess the Neotropic Cormorants' development stages, whereas descriptions in Davis & Kushlan (1994) were used to assess the Green Herons' ones.

Results

Neotropic Cormorants were recorded to play on the ground of a mud islet where the birds rested and dried their feathers after feeding bouts, and while swimming close to the islet or elsewhere in the pond. Green Herons were recorded to play while walking on perching on branches overhanging the pond. All records including the fortuitous one at a mangrove stream are here summarised (Table 1), and some of the play bouts are described below.

Usually only one individual from a group of about 10 to 30 cormorants engaged in play, although two to four individuals playing at the same time, isolated or in couples were recorded as well (Table 1). One such latter instance is exemplified by a non-breeding adult bird playing with a long branched twig while on the ground, and an immature bird playing with a stick while in the water (Figure 1a). The bird with the twig held it in its bill, walked a few steps, released the twig to pick it up again and proceeded with this behaviour for 70 seconds, after which it dropped the twig and began preening. The bird with the stick held it in its bill, manipulated and plunged it in the water, and repeated this sequence for 60 seconds, after which it dived and reappeared on surface with a pod in its bill, and for 40 seconds it repeated a sequence similar to that displayed with the stick. After dropping the pod in the water, this bird dived again and played with another stick for 40 seconds, after which it left the islet. Another instance of several birds behaving at the same time is illustrated by two non-breeding adults playing tug-of-war with a stick, a non-breeding adult playing with a long twig and another playing with a root (Figure 1b). The behaviour of the birds that were manipulating the twig and the root was similar to that described above (including duration), only that this time the birds stayed on the same spot instead of walking. The two birds playing tug-of-war stayed side by side holding a stick in their bills, pulling and pushing it, and when one of the birds lost its hold on the stick it immediately grabbed the object again. When the stick dropped, it was immediately picked up by the same individual and the manipulation proceeded for 60 seconds, after which the stick was dropped and one of the birds began preening and the other walked away. Instances of playing with relatively long objects while swimming were rarely recorded, in which case a juvenile bird played up to 40 seconds before releasing the play object. It shook and turned the plant piece (Figure 1c) with vigorous rotating and lateral head movements.

Playing with live or dead fishes was displayed by cormorants only while swimming. The most impressive instance was displayed by a juvenile bird that caught a fish alive and manipulated it until the fish died. This bird held the fish in its bill, manipulated it for a while as if to swallow this potential prey (Figure 2a), plunged it in the water (Figure 2b), and tossed it in the air with a quick upwards movement of the head, the fish making a full loop (Figure 2c). This sequence was repeated six times during 80 seconds while the bird was swimming, after which the fish was released. Cormorants playing with a dead fish displayed similar behaviour to that described above but the duration was half the time.

Duration of the play bouts ranged from 5 to 80 sec ($x = 35.25$; $sd = 24.19$). The shortest bouts were recorded for cormorants manipulating leaves and pods while on the ground, and the longest bouts

Birds play with objects

Table 1. Records of play behaviour for Neotropic Cormorants (*Phalacrocorax brasilianus*) and Green Herons (*Butorides striata*) in São Paulo state, southeastern Brazil, throughout the year 2007. Date (m = morning, a = afternoon), development stage, play object (estimated size), and substrate are noted. Bold letters indicate the same individual on the recorded date.

Tabela 1. Registro de atividade lúdica em biguás (*Phalacrocorax brasilianus*) e socozinhos (*Butorides striata*) no estado de São Paulo, Brasil Sudeste, ao longo do ano de 2007. Estão anotados data (m = manhã, a = tarde), estágio de desenvolvimento, objeto da brincadeira (dimensão estimada) e substrato. Letras em negrito indicam o mesmo indivíduo na data do registro.

Species	Date	Stage	Object	Substrate
<i>P. brasilianus</i>	27 June (m)	juvenile	live fish (10 cm)	water (swimming, diving)
	28 June (m)	adults (2)	stick (20 cm)	mud islet (standing)
	same date	adult	twig (70 cm)	mud islet (standing)
	same date	adult	root (70 cm)	mud islet (standing)
	30 July (a)	juvenile	plant debris (10 cm)	water (swimming, diving)
	same date	juvenile	dead fish (5 cm)	water (swimming, diving)
	same date	juvenile	stick (15 cm)	water (swimming, diving)
	08 August (a)	juvenile	unidentified (5 cm)	water (swimming)
	10 August (a)	juvenile	stick (10 cm)	water (swimming, diving)
	19 August (a)	adult	branched twig (80 cm)	mud islet (walking)
	same date	immature	stick (10 cm)	water (swimming, diving)
	same date	immature	leaf (10 cm)	water (swimming, diving)
	same date	immature	pod (15 cm)	water (swimming, diving)
	same date	juvenile	stick (10 cm)	water (swimming, diving)
	29 August (a)	juvenile	leaf (5 cm)	mud islet (standing)
	same date	juvenile	stick (10 cm)	mud islet (standing)
	same date	juvenile	plant debris (10 cm)	mud islet (standing)
	same date	juvenile	leaf (10 cm)	mud islet (standing)
	07 September (m)	juvenile	dead fish (5 cm)	water (swimming, diving)
	13 December (m)	juvenile	plant runner (60 cm)	water (swimming, diving)
<i>B. striata</i>	30 October (a)	juvenile	wood piece (5 cm)	branches over water
	same date	juvenile	fruit (0.5 cm)	branches over water
	same date	juvenile	insect (1 cm)	branches over water
	02 November (m)	juvenile	unidentified (5 cm)	branches over water

were recorded for birds manipulating large plant pieces (while on the ground or in the water) and fish while in the water.

Green Herons were recorded manipulating small objects while perching or slowly walking on overhanging branches at the pond. One such instance is exemplified by a fledged juvenile that picked a small, floating piece of wood in its bill (Figure 3a) released it in the water and picked it up again, proceeding with this behaviour for 90 seconds. The same bird picked up a small fruit (Figure 3b), released it close to the water surface, picked it up again (Figure 3c) and proceeded for 70 seconds; afterwards, it caught a small insect floating on the water surface and repeated the sequence described for the fruit, but the play now lasted a little longer (80 seconds). All objects were picked up and manipulated while the heron stayed on the same spot.

Discussion

The behaviours reported here for the Neotropic Cormorant and Green Heron qualify undoubtedly as play, as they have several characteristics usually associated with this behaviour type. The cormorant that manipulated a fish until it died and then released instead of swallowing it exemplifies the play concept well, as its behaviour had six of the attributes that characterize play (executed repeatedly, exaggerated, quick and energetically expensive, stimulation seeking, no obvious immediate function, and absence of final consummatory act).

The behaviours here recorded are regarded as object play, i.e., frolicsome interactions with an inanimate object including explora-

tory manipulation. On the other hand, the two adult cormorants that engaged in tug-of-war with a stick displayed both object and social play (see Heinrich & Smolker 1998). Object and social play are believed to be related to the development and acquisition of control systems that regulate different types of behaviour (e.g. Millar 1981) and to have a role in general motor training and practice of particular skills, although there still is considerable debate about the functions of play (see reviews in Bekoff & Byers 1998).

Stabbing at inanimate objects within reach is recorded as play for nestlings and fledglings of the Great Blue Heron (Butler 1992) and Cattle Egret (Telfair II & Raymond 2006). Handling sticks and other materials is recorded as play for nestlings and young at nesting colonies of the Pelagic Cormorant (Hobson 1997) and Red-faced Cormorant, including tug-of-war for the latter species (Causey 2002). However, no data seems available for the more elaborate play behaviours here described (handling small inanimate objects by juvenile Green Heron and handling live or dead fish by Neotropic Cormorants). Additionally, no play for adult cormorants has been recorded to date, and in the present study handling sticks by juvenile and immature birds was recorded in a different environmental and social context (resting areas, not nesting colonies).

Surmising that bird play is indeed important to learning, development, and practice of given skills (e.g. Ficken 1977, Kitowski 2005, Nelson 2006), it should be expected for a species such as the Green Heron, as this bird is known to manipulate inanimate

Sazima, I.



Figure 1. Neotropic Cormorants (*Phalacrocorax brasilianus*) play with objects: a) a non-breeding adult manipulates a branched twig while on the ground (left) and an immature individual manipulates a stick while on the water (right); b) four birds playing at the same time – a non-breeding adult grabs a long twig on the ground (extreme left), two non-breeding adults play tug-of-war with a stick (left), and another adult grabs at a root on the ground; and c) a juvenile shakes a large plant runner while swimming – note rotation of its head.

Figura 1. Biguás (*Phalacrocorax brasilianus*) brincam com objetos: a) uma ave adulta manipula um ramo em terra (à esquerda) e um indivíduo imaturo manipula um graveto na água (à direita); b) quatro indivíduos brincando ao mesmo tempo – um adulto apanha um ramo longo do chão (extrema esquerda), dois adultos brincam de cabo-de-guerra com um graveto (esquerda), e um outro adulto agarra uma raiz no chão; e c) um juvenil chacoalha um longo estolão enquanto nada – note rotação da sua cabeça.

Figure 2. A Neotropic Cormorant (*Phalacrocorax brasilianus*) plays with a fish until the death of the latter: a) the bird holds the fish as if to swallow the potential prey; b) the fish is plunged in the water; and c) the fish is tossed into the air making a complete loop.

Figura 2. Um biguá (*Phalacrocorax brasilianus*) brinca com um peixe até a morte deste: a) a ave segura o peixe no bico como se fosse engolir a presa potencial; b) o peixe é mergulhado na água; e c) o peixe é lançado no ar, fazendo uma volta completa.

Birds play with objects



Figure 3. A fledged Green Heron (*Butorides striata*) juvenile plays with floating objects: the bird picks up a small piece of wood (a); the same individual holds in its bill a small fruit (b), which it releases close to the water surface and picks it up again (c).

Figura 3. Um socozinho juvenil (*Butorides striata*) brinca com objetos flutuantes: a ave apanha um pequeno pedaço de madeira (a); o mesmo indivíduo segura no bico um pequeno fruto (b), que solta próximo à superfície da água e apanha novamente (c).

and living objects to lure fish (e.g. Higuchi 1986, Davis & Kushlan 1994, Sazima 2007). Such luring behaviour presumably requires skills such as recognition of objects adequate to attract fish, as well as to manipulate and follow a given object from a distance (see Sazima 2007). Thus, play with small floating objects may have the function of perfecting a behaviour that may appear later in the hunting repertoire of the Green Heron (even if not all individuals lure fish with bait, IS pers. obs.).

The instances of Neotropical Cormorants manipulating objects such as twigs and sticks may be viewed as a type of practice to gather and arrange nest material, as cormorants in general build nests with the same or similar material (e.g. Orta 1992, Telfair II & Morrison 2005). Some of the instances of leaf and pod manipulation may belong in this category as well (but see below). It is noteworthy that no play was recorded for individuals in breeding plumage, or during the breeding season at the study area. On the other hand, the juvenile cormorant's catching, plunging, and tossing a fish in the air seems important to perfect the manipulation of fish during actual hunting, as all these behaviours are present in the habitual "catch, plunge, toss, and swallow" behaviour of cormorants, especially when the fish is larger and/or armed with spines; additionally, dead fish and fish offal are occasionally consumed (IS pers. obs.). Post-fledgling Montagu's Harriers (*Circus pygargus*) are known to play with selected inanimate objects similar in size to natural prey (Kitowski 2005), a situation somewhat comparable to cormorants playing with pods and leaves, as well as with dead fish. Thus, catching and plunging smaller objects such as leaves, pods, and short sticks while swimming may belong to this category as well or, less likely, be a variant of practicing to gather nest material.

Play is an important component of the behavioural repertoire of juveniles and even adults of several bird species and certainly merits a closer look. No doubt that additional instances of play behaviour will be added for the few examples reported for Brazilian birds (e.g. Sick 1997, this paper) once its elusive and ephemeral nature becomes more apparent and appealing to field ornithologists.

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Sazima, I.

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