

AN ETHOGRAM FOR THE YELLOWEYED PENGUIN *MEGADYPTES ANTIPODES*

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SUMMARY

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Previously published work on the behaviour of the Yelloweyed Penguin *Megadyptes antipodes* has dealt in detail only with the displays associated with pair formation and breeding. A full ethogram is presented for the Yelloweyed Penguin. Behaviours are described in terms of form and context, and no attempt is made to ascribe either meaning or motivation.

INTRODUCTION

Mackay (1972) distinguishes between signals that are communicative, i.e. goal-directed by the sender, and those that are merely perceived by the recipient. Thus for a signal to be communicative in Mackay's sense one must show that the sender uses it with the intent to influence the receiver. More and more however, it is being found that the behaviour of animals is influenced by the actions of conspecifics. Every feature of an animal's appearance or actions is potentially informative to others, the relevance of such information depending on the context in which they take place. Communication is essentially an interactional process by which information is shared via displays, formalized interactions, or incidental non-formalized sources (Smith 1977).

Richdale (1951) presented detailed descriptions of the behaviours of the Yelloweyed Penguin *Megadyptes antipodes* associated with pair-formation and breeding. Postures and movements were placed in categories according to their context, and functions were ascribed to these on the basis of the

past history and status of the interacting birds. Richdale relied on his long-term experience with the Yelloweyed Penguin to classify the attitudes he observed, consequently display labels are suggestive of motivation rather than descriptive of form, and behaviours may overlap several categories. Jouventin (1982) attempted to standardize the classification of penguin displays, but was unable to observe the full behavioural repertoire of the Yelloweyed Penguin, and consequently relied to some extent on Richdale's original interpretations (Richdale 1951). A full ethogram has not been produced for the Yelloweyed Penguin, preventing the inclusion of *Megadyptes* in comparative ethological studies.

This paper presents an ethogram for the adult Yelloweyed Penguin. Behaviours are described in terms of form and context. The apparent low rate of conspecific interaction on land due to the solitary nature of the Yelloweyed Penguin makes quantitative analyses difficult. For this reason I have not attempted to ascribe motivation nor message to behaviours.

METHODS

Behavioural descriptions are based on four years' work, 1984 to 1987, in Yelloweyed Penguin breeding areas on the southeast coast of New Zealand's South Island. Form and context of behaviours were determined from observations of banded birds at marked nests throughout breeding from the pre-egg phase in September to post-guard phase in February, and during the winter, April to August.

RESULTS

Behaviour labels and descriptions are given below.

Rest

The neck is withdrawn, head and bill facing forward, flippers by the side of the body. Penguins may doze, opening their eyes between five and 15 times per minute, or sleep with their eyes closed. When resting upright the penguin sits down on the tarsi, when prone the penguin lies on its ventral surface with the feet withdrawn under the belly, or extended backwards.

Comfort behaviour

Involves all the actions concerned with the maintenance of the body surface, including shaking, stretching, cleaning and preening movements. Descriptions are based on those given by Ainley (1974) for the Adélie Penguin *Pygoscelis adeliae*.

Shaking movements

Head-shake. Rapid head flicks from side-to-side perpendicular to the body axis.

Body-shake. With the neck withdrawn and the bill directed forwards and upwards, the body is twisted vigorously causing both head and flippers to rotate also.

Ruffle-shake. With the neck stretched forwards the feathers of the head, neck and body are ruffled. This may be followed by a head or body shake.

Tail-wag. The tail is rapidly swept from side-to-side parallel to the ground.

Rapid-wing-flap. The flippers are flapped up and down.

Sneeze. A sharp exhalation of air, associated with a short sideways flick of the head, and may be followed by a Head-shake and swallowing.

Stretching Movements

Both-wings-stretch. Usually in two parts. The first is a backwards thrust of the flippers, legs and body are upright, neck stretched and bill sometimes open. The flippers are held back for a few seconds before being brought forward for the second part of the movement. The flippers are then held against or slightly forward of the flanks for a few seconds, the neck is withdrawn and the back is bowed forwards.

Leg-stretch. When prone the penguin extends one leg at a time straight behind with the toes spread.

Yawn. The bill is fully opened, the neck withdrawn and the head tilted back. As the bill closes the head is lowered and the penguin may swallow several times.

Cleaning

Shoulder-rub. The penguin rubs the back or side of the head against the shoulder.

Wing-rub. The flipper is raised straight up from the side, and the back, side or top of the head or throat is rubbed along the flipper's leading edge. This is usually preceded by the transfer of uropygial gland oil from the bill to the leading edge of the flipper.

Head-scratch. Supported on one foot the penguin bends towards the other foot and extends the flipper on that side down to touch the ground. The free foot is then raised over the lowered flipper to scratch the head with a rapid up and down movement.

Preening

Involving contact between the penguin's bill and the feathers, and may include Shoulder- and Wing-rub movements.

Dry Preening. Without the use of oil.

Oil Preening. Involving the transfer of oil to the feathers from the uropygial gland at the base of the tail.

There are three types of preening movement:

- combing - the closed bill moves down through the feathers.
- billing - the closed bill is vibrated during combing.
- nibbling - the bill moves slowly through the feathers with short, rapid biting movements.

Bathing

Comfort behaviour in the water, including Head-dip, Head-shake, Tail-wag and all preening movements.

Mutual Preening

Simultaneous allopreening. Usually confined to the head and neck regions, with nibbling being the most commonly occurring movement. The term Kiss Preen was used by Richdale (1951) to refer to the specific mutual preening of the throat.

Thermoregulation

Panting

Characterized by breathing with an open bill, from either an upright or prone position. The neck is extended, the head raised and may be tilted back about 45 degrees. The eyes may be open or closed, and the tongue is sometimes lifted.

Flippers-raised

Adopted in an upright or a half-prone posture. Both flippers are held out from the sides of the body, usually rotated to present the ventral surfaces forward. The head is raised and panting often occurs. In some cases the penguin may stand off its tarsi, exposing the dorsal surfaces of both feet. Both ventral flipper and feet may flush bright red.

Walking

In an upright posture, neck relaxed, head and bill directed forward, flippers raised or lifted back. Where the ground is uneven or very steep the penguin may take short jumps or hops, and the bill may be used momentarily to anchor the body. When evading humans, or when slipping down steep slopes, penguins may toboggan on their bellies using feet and flippers to propel themselves forward.

Looking Around

While walking a penguin may pause and look around, the neck extended and the bill slightly raised. During such pauses penguins may Wing-quiver, both flippers moving rapidly up and down only about two centimetres. Penguins returning to nests during breeding may give a two-syllable call while looking around, or in response to a similar call from a mate.

Nest Building

Six activities are involved:

Searching. Nest material is gathered from up to 50 m from the nest site. A searching penguin will frequently stop and lower its head, and may pick up

and then discard material (most commonly dry vegetable matter). Searching may be interrupted by bouts of preening.

Collecting. Nest material may be either picked up off the ground, or pulled from living plants.

Carrying. Nest material is carried in the bill.

Depositing. Nest material is dropped into or on the edge of the nest with a head-shaking movement.

Arranging. A penguin either lying or standing in the nest may reach forward and collect material from the outer edge of the nest, drawing their head back and depositing the material in the nest.

Scraping. The penguin lies prone in the nest bowl and scrapes backwards with one or other foot, distributing material to the rim of the nest.

Mutual Nest Building

One bird (usually the male) collects and deposits material in front of the other bird lying prone in the nest. The pair may perform a Mutual Display before the prone bird arranges the material in the nest bowl.

Copulation

Refers to all the behaviours associated with coition, including pre- and post-mounting behaviours, and mounting itself (Spurr 1975). Only one complete copulation has been recorded to date. Its form is described in Seddon (1989a).

Incubation

The eggs are positioned between the feet against the brood patch, usually with the long axes of the eggs parallel. The incubating penguin may lie prone or half-prone. The half-prone posture is most often seen before the laying of the second egg (Seddon 1989b). Chicks up to about one-week old are covered in the same manner.

Chick Care and Feeding

Has been described in detail in Richdale (1957) and Seddon (1990), and will be summarized only briefly here. Hatching of the two semi-altricial chicks is synchronous. Chicks are brooded by one or other parent for the first 25 days, and attended at the nest for the first six to seven weeks (guard phase). After this time and until fledging and independence at 15 weeks of age, chicks are left unattended during the day (post-guard phase) while both adults forage at sea. Chicks are fed by both parents, by regurgitation bill-to-bill following vocal solicitation by the chicks. Sibling rivalry is not intense and in general both chicks are fed at each feeding session.

Withdrawn Crouch

A penguin on a nest incubating eggs or guarding chicks will go into the Withdrawn Crouch when approached by a human. The body may be flattened down into the nest, neck withdrawn and flippers pressed against the sides of the body.

Attack

This may consist of pecking with the bill closed or open, a jab or gripping with a twist, and rapid blows with the leading edge of the flipper.

Shoulders-hunched

Neck lowered, head and bill directed forwards, shoulders raised, body leaning forward. Usually a static posture adopted by adult at the nest during the guard phase in response to intrusion by conspecifics or humans.

Alternate Stare

Head moved slowly from side to side so that alternate eyes are presented to the opponent. It is given from both upright and prone positions in response to intrusion onto the nesting territory.

Point

Closed bill pointed directly at opponent, body leans forward, neck extended, crest erect and eyes wide open. Often accompanied by a loud call if the intrusion is sudden, unexpected and close.

Slender Walk

Body upright, flippers held forward, neck extended vertically, bill forward and parallel to the ground. A variation of this Slender Walk may occur where the neck is lowered and the shoulders raised, reminiscent of the Shoulders-hunched posture but with the bill held down and the flippers farther forward.

Bill-up

A penguin will walk, in a Slender Walk, or in a Shoulders-hunched posture, up to and about one metre past another individual before stopping and adopting the Bill-up posture with body upright, bill vertical, neck fully extended and flippers forward. This may be maintained for approximately four seconds, after which the neck and then the bill are lowered.

Neck Raised

A stationary Slender Walk posture given in response to the Bill-up.

Bill-down

Body upright, flippers forward, neck upright but the bill hung down parallel to the neck. The head may be turned to one side. Similar in form to the Neck Raised, the Bill-down is given by one or other bird of a pair at the nest, usually occurring as an element of the Mutual Display, or may follow the completion of the Bill-up as the performing bird lowers its head and looks around.

Mutual Display

The penguin stands up, body leaning slightly forward, bill open emitting a loud call of a series of notes. Birds of a pair call together. The Mutual Display may commence with a variety of soft vocalizations and head shaking, building in intensity to the full display, often subsiding with similar actions. The Mutual Display may be performed any time a mated pair is together.

Ecstatic

Bird stands on toes with tarsi and legs erect, flippers held stiffly forward, head and bill vertical, bill open and gives a loud trilling 'fantastically suggestive of the tremolo of giant crickets' (Richdale 1951: 23), which may build to become a continuous call. During the vocalization the bill and throat vibrate, and the flippers may quiver. Performed mainly by lone males occupying nest sites during the pre-egg phase, but may be heard at any time of the year.

DISCUSSION

The descriptions presented here are an attempt to avoid confusion between form and possible, but as yet unproven, function. Some reference to the work of Richdale (1951) and the reinterpretation of his descriptions is necessary to avoid further confusion with specific aspects.

Richdale (1951) described a behaviour which he considered to be the nearest approach to outright fighting in the Yelloweyed Penguin. The Tete is a peck aimed at the head of an opponent, though contact need not be made. Often both birds will alternately aim such pecks, and strike with the flippers. Jouventin (1982) used the term Tete to describe frontal attacks by prone birds, usually on the nest. High inter-nest spacing (Seddon & Davis 1990) precludes prone Tetes by nesting Yelloweyed Penguins, the behaviour being more commonly performed by upright birds away from the nest, and usually in conjunction with other actions of more overt aggression. The chest-pushing and chasing of

the Adélie Penguin (Spurr 1975) have not been observed in the Yelloweyed Penguin.

The Shoulder-hunched posture of the Yelloweyed Penguin is similar in appearance to the Slender Walk posture of the crested penguins *Eudyptes* sp. (Warham 1975), but with the flippers held back and slightly to the sides. The Slender Walk of crested penguins may grade into the Shoulders Hunched Attitude (Warham 1975). Jouventin (1982: 13) states that: 'a characteristic posture common to all penguins is assumed when the birds sneak amidst the colonies brooders, avoiding bill and wing blows on their way'. It is difficult to imagine this situation arising in nesting areas of the Yelloweyed Penguin, the least colonial species of penguin (Darby & Seddon 1990). However, interactions between birds on landing beaches give rise to apparently equivalent postures. The Slender Walk of the

Rockhopper Penguin *Eudyptes chrysocome* (Warham 1963) and the Adélie Penguin (Spurr 1975) are similar to the attitude adopted by the Yelloweyed Penguin when one bird approaches another.

Jouventin (1982) gives an illustration drawn from a photograph taken by Richdale (1951: Fig. 5, p. 35). Richdale called this the Gawky Attitude, but does not mention it in the text. Jouventin labels this attitude Bowing, presumably not because of its form but rather due to its context. Bowing in other penguins tends to involve some degree of head lowering. For this reason Richdale stated that the Yelloweyed Penguin did not Bow, though he conceded that the behaviours associated with the Bill-up (called Salute in Richdale 1951), e.g. the Neck Raised posture (Table 1), were contextually equivalent to bowing in other penguin species.

TABLE 1
YELLOWEYED PENGUIN *MEGADYPTES ANTIPODES* BEHAVIOURS DESCRIBED IN THIS
STUDY AND THE EQUIVALENT BEHAVIOURS AS NAMED BY RICHDAL (1951)

This study	Richdale (1951)
Shoulders-hunched	(described but not named)
Point	Glare/Open-yell/Tete
Bill-up	Salute
Neck raised	Gawky Attitude
Bill-down	Sheepish Look
Mutual	Half-trumpet/Welcome
Ecstatic	Full-trumpet

Much confusion exists over the application of the term Ecstatic to the Yelloweyed Penguin. Richdale (1951) considered the Ecstatic to be solely a mutual display in his attempt to resolve the use of the terms Ecstatic or Ecstatic Attitude to describe

variously either mutual (Huxley 1930, Murphy 1936, Richdale 1941) or solitary behaviour (Falla 1937, Roberts 1940), or both (Levick 1914, Bagshawe 1938), in other penguin species. Richdale (1951) concluded that the Yelloweyed Penguin performed

use of the terms Half-trumpet, Welcome and Ecstatic. The Half-trumpet and the Welcome are to be considered variants of the Mutual Display (Table 1). Jouventin (1982) divided sexual postures into Mutual Displays by pairs, and Ecstatic Displays performed by lone birds. Richdale's Full-trumpet clearly falls into Jouventin's category of Ecstatic Display in terms of its form and context.

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