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SHORT COMMUNICATION

THE DECLINE OF THE INTERSPECIFIC AGONISTIC DISPLAYS IN AN ADULT FEMALE INDIAN EAGLE OWL *BUBO BENGALENSIS* (Aves: Strigiformes: Strigidae): A CASE OF HABITUATION TO HUMAN APPROACH

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The decline of the interspecific agonistic displays in an adult female Indian Eagle Owl *Bubo bengalensis* (Aves: Strigiformes: Strigidae): a case of habituation to human approach

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Abstract: Habituation to humans was observed in a single breeding female *Bubo bengalensis* and the responses documented. It was observed that owls recognize threats, and differentiate between people. The data shows how 'familiarity' can result in reduced flight range and agonistic displays. It was found that the most familiar observers elucidated the least response to human intrusion whereas the role of unfamiliar intrusion had an adverse affect which prevented further studies of the subject.

Keywords: Familiarity, habituation, neuroplastisity, nonassociative learning, sensitization.

Thompson (2009) reminds us of one of Aesop's fables: "A fox that had never seen a lion, when he fell in with him for the first time in the forest was so frightened that he was near dying with fear. On his meeting him for the second time, he was still much alarmed, but not to the same extent as at first. On seeing him for the third time, he so increased in boldness that he went up to him and commenced a familiar conversation with him". This shows that the notion of habituation is quite old and contemporary field biologists have made use of it and many seminal breakthroughs in behavioural science / ecology were due to it—for example, in the Chimpanzee *Pan troglodytes* (Goodall 1971), Mountain Gorilla *Gorilla berengi* (Fossey 1983) and African Elephant *Loxodonta africana* (Douglas-Hamilton & Douglas-Hamilton 1975).

What exactly is habituation? In short, habituation is a form of adaptive behaviour or neuroplasticity that is classified as nonassociative learning (a change in a response to a stimulus that does not involve associating the presented stimulus with another stimulus or event such as reward or punishment) in which an organism decreases or ceases to respond to a stimulus after repeated presentations (Bouton 2007). It is a primitive kind of learning and a basic process of biological systems. Organisms do not need conscious motivation or awareness for habituation to occur; it enables them to distinguish meaningful information from background stimuli. Habituation has been observed in an enormously wide range of species from single-celled organisms (e.g., Wood 1998) to higher vertebrates, including humans (e.g., Norman et. al. 2005). Habituation is contrary to sensitization which is the opposite process: sensitization

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is an increase in the elicited behaviour from repeated presentation of a stimulus (akin to the methods used to train pets and performing animals which use rewards and sometimes punishment).

Habituation has been tested on owls, specifically the Barn Owl *Tyto alba*, in laboratory conditions to understand underlying neural mechanisms (Gutfreund & Knudsen 2006; Reches & Gutfreund 2008 Nester et. al. 2011; Gutfreund 2012; Dutta & Gutfreund 2014). Habituation has also been observed in the field in the Eastern Screech Owl *Megascops asio* (Gelbach 2009) and Burrowing Owl *Athene cunicularia* (Martin 1973). Habituation to noise has been studied in the Spotted Owl *Strix occidentalis* since it is an endangered species with populations occurring around military air bases in the United States of America (Delaney et. al. 1999; Johnson & Reynolds 2002).

Habituation to human intrusion and its relation to inter-specific intimidatory behaviour has been recorded in a nestling Indian Eagle Owl *Bubo bengalensis* (Ramanujam 2003a). Inter-specific intimidatory behaviour has been recorded in adult *Bubo bengalensis* in defence of their nestlings (Ramanujam 2004, 2010).

Methods

Nanmangalam Reserve Forest (NRF) ($12^0$55'N & $80^0$18'E) lies on the outskirts of Chennai adjacent to the Tambaram–Velacheri road (at a distance of approximately 7km from the latter). The main path to the north towards small hillocks leads to five disused water filled granite quarries. These are occupied by three pairs of *Bubo bengalensis* that nest there. One pair and their young were subjected to 10 approaches each by the author, a photographer and some unknown humans from 10th to 28th Jan 2009. The responses of the incubating female were recorded in relation to the distance of humans from the nest site. This is a continuum of an earlier study concerning the spread-winged agonistic displays of *Bubo bengalensis* (Ramanujam 2010) where I presented the results concerning habituation to human approach of a brooding female at the nest.

Results and Discussion

Descriptions of various behavioural traits in *Bubo bengalensis* have earlier been described in general (Ramanujam 2007) and specifically concerning the approach of humans to the nest site (Ramanujam 2010). Nevertheless, a very brief description of behavioural traits pertinent to this effort is given below (Figs. 1 & 2):

1. Sleeked plumage (Image 1): A concealing attitude adopted by all owls with the feathers drawn in which gives them an inconspicuous look.

2. Ruffled plumage (Images 2 & 3): When agitated owls erect body plumages making them appear larger than they really are and bow and sway from side to side. This display is accompanied by loud hissing and bill clapping, with the occasional alarm call. This plumage and associated vocalizations are maintained throughout the entire time when humans are present in the close vicinity of the nest.

3. Transition spread-winged agonistic display (Image 4): When extremely stressed female owls will swell their feathers to their full extent and open their wings making them appear many times their usual size.

It was interesting to note the responses of the brooding female *B. bengalensis* to different humans (Fig. 3). The photographer spent most time in the vicinity of the nest site (at least 48 hours a week) followed by the author (at least 24 hours a week). The unknown humans were a disparate set of nature photographers who had been visiting the site independently on and off in order to photograph wildlife and were quite unknown to the author.

Since the photographer was the one who was most familiar with the owl, its responses to his approach were quite illuminating and showed a high degree of tolerance and habituation. Though the preliminary responses to

Image 1. Sleeked plumage

Image 2. Ruffled plumage

Image 3. Bowing and swaying

Image 4. Transition spread-winged agonistic display

his approach were no different from those of others, it gradually began to accept his presence and wound down aggressive displays. For the first three approaches it maintained the cryptic sleeked plumage until a distance of approximately 30m before it became agitated. Then it began erecting body plumage, hissing and bill clapping around a distance of 27m but this gradually wound down until at the ninth approach when it began to intimidate the photographer only at half that distance (15m). The agonistic intermediate spread-winged agonistic display was first resorted to at a distance of approximately 24m but steeply wound down to only 10m at the sixth approach and after that ceased completely over the next four approaches.

Though the intensity of tolerance was not so apparent to the author's approach, it too showed a fair degree of approachability without getting too agitated. The sleeked plumage was maintained around 30m for the first two approaches before it began to intimidate the author by ruffling its plumage, hissing and bill clapping at a distance of 27m but on further approaches this display wound down to approximately 23m. The first time it employed the spread-winged display was at 24m at the first approach but that too wound down to 17m at the eighth approach after which it did not display in that fashion for the last two approaches.

The behaviour of the subject to the approach of the photographer and author was in stark contrast to the approach of unknown humans and the owl took no chances. The sleeked plumage was maintained to a distance of approximately 35m after which it became agitated and began all forms of intimidatory agonistic displays from 26m to 28m before flying away. One notable feature was that the subject maintained a flight distance of between 10m and 8m, irrespective of the type of human approach.

Though there are many fascinating variations of behaviour between the responses employed by the subject between the humans to whom it was habituated and strangers, one behavioural trait stands out significantly: the non-employment of the spread-winged displays towards the photographer and author towards the end of the experiment. The 'refusal' to indulge in high intensity spread winged threat displays has also been recorded in the Saw-whet Owl *Aegolius acadicus* under captive conditions (Collins 1993) which shows that in captivity animals may get more habituated to human approach.

For a considerable period of time conspicuous ritual displays have been used to confirm the theory that these are more useful as taxonomic characters than all other forms of behaviour (Lorenz 1941). The degree of similarity of spread-winged displays in the Strigiformes, their orderly progression from general intimidation to overt ritualistic demonstration is considerably striking (Ramanujam 2003) and Phylogenetically, the similarities

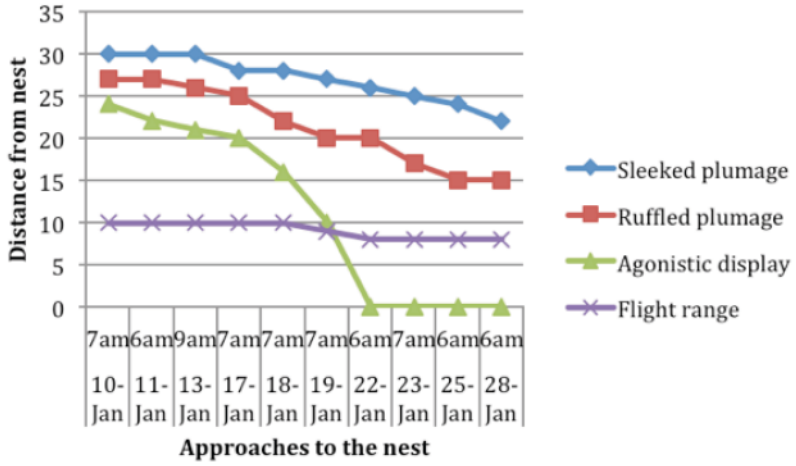

Figure 1. Responses of female *Bubo bengalensis* to photographer's approach to nest site (Approximate distance in m)

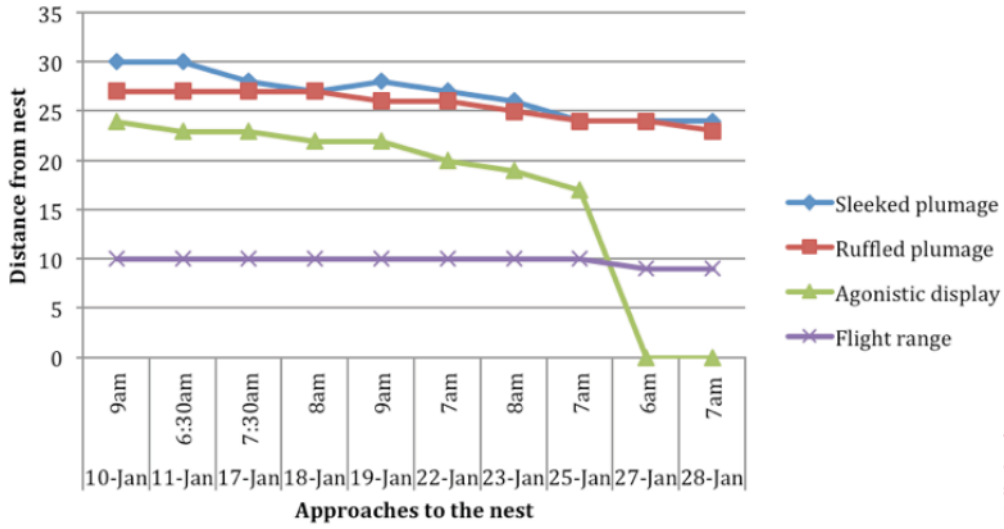

Figure 2. Responses of female *Bubo bengalensis* to author's approach to nest site (Approximate distance in m)

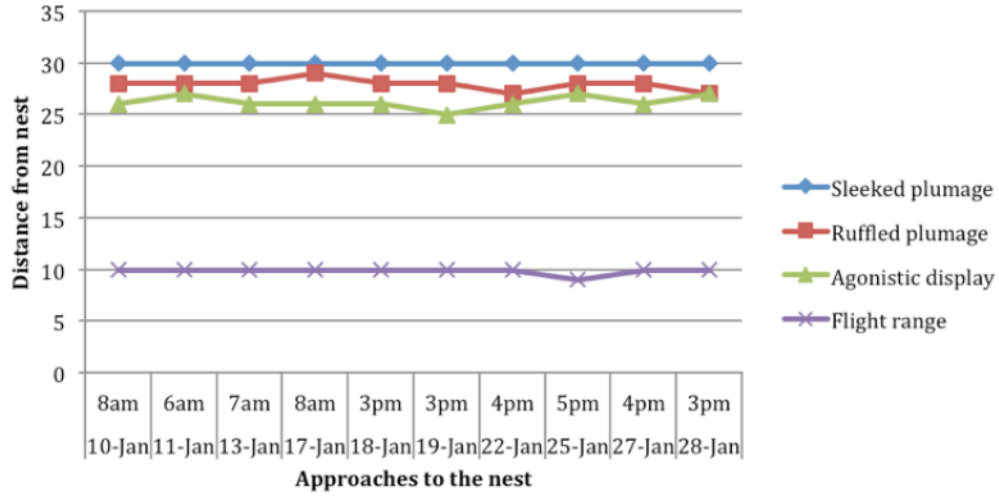

Figure 3. Responses of female *Bubo bengalensis* to unknown human approach to nest site (Approximate distance in m)

in their causation, function and mechanism, together with morphological similarities, strongly supports the conclusion that the Strigidae is a monophyletic group (Ramanujam 2003). Yet, the non-employment of such displays have shown to be altered which is significant in that it confirms the theory that innate patterns of behaviour become compromised if the stimulus occurs repeatedly but causes no harm. This has obvious survival value because if animals never habituate to non-threatening stimuli, they would be constantly spending time in high intensity intimidatory behaviour and unnecessarily expending their time and energy without any desired result (Magle et. al. 2005).

I have simply described the adaptive value of observed habituated behaviour but others may find it useful to infer psychological processes from observed behavioural changes. Many questions exist: for example, is habituation a singular process, with lots of manifestations and applications? Or is it better understood as a broad set of distinct processes, all which support the essential adaptation of an organism to repeated experience? It is only future research that may help answer these fundamental questions about biological order and design.

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