

Through Birds' Eyes by Graham Martin

November 7th, 2006.

This was a fascinating and wide-ranging talk about bird vision and bird behaviour and the elusive search for a predictable relationship between the two. The talk included the particular visual feeding problems of nocturnal birds (owl, nightjar & kiwi) and diving birds (king penguin & grebe), and the evolution of 'sunshades' to keep the sun's glare out of the large eyes of visually acute albatrosses and eagles.

We learnt that birds see a very different world than we do, and that there is huge variation in birds' eyes and therefore in how and what an individual species sees. Eyes vary in size, from the ostrich with an eye of 45mm diameter to the tiny eye of a humming bird whose body length may be only 50mm. Differences in the structure of the retina of the eye allows for variation in colour and acuity of sight; the position of the eyes on the head determines the field of vision. Thus, nocturnal and deep-diving birds may see in mainly black and white, while blue tits are able to see in the ultra violet range; buzzards and eagles can see far more detail than we can dream of, and a bittern's eyes are positioned so that it can see *below* its bill.



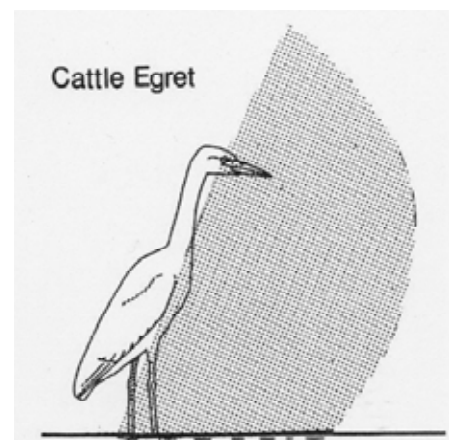
Bittern from below (G.Martin)

"A bird is a wing guided by an eye"* is not true for all species. For the majority of birds vision is the dominant sense, but vision has evolved in conjunction with the other senses and different species have developed unique combinations of sight, touch and hearing that suit very different lifestyles.

Graham Martin is Professor of Ornithology at Birmingham University and has spent many years researching the link between a birds' vision and its behaviour. Part of his talk focussed on how a bird's field of vision relates to their foraging behaviour. What follows is a brief and simplified taste of it:

The shoveller is a filter feeder; its eyes are situated so that it cannot see its bill but can see comprehensively above its head. I've seen them on the Exe with their heads down; they don't need to look up to see if there's danger above them and to filter feed in the mud you don't need to see what your bill is doing!

In contrast **the wigeon** is a selective grazer. Its eyes are so placed that its field of vision focuses on its bill; it can see what it is eating. The downside is that it cannot see, as a shoveller does, behind its head and has to stop feeding to look round. Perhaps their



Visual field of cattle egret (G Martin)

tendency to feed in flocks reflects this inability to feed and look for predators at the same time?

When I see a **heron** fishing it appears to be looking straight ahead, so how does it see its prey *and* catch it before it disappears? It appears that the heron (and egret, see diagram) has a comprehensive field of vision, similar to the shoveller, but focussed in front and below and including its feet. This means the bird can remain motionless while watching for its prey and keeping an eye out for predators at the same time

So is it possible to predict a relationship between a bird's vision and its foraging behaviour? As a filter feeder the **flamingo** forages with its head upside down; it might therefore be expected that the eyes be positioned so that there is a good field of vision ahead. Not so! It can see the tip of its bill clearly and is virtually blind ahead. But how can it be an advantage to see a bill that is covered in mud? It seems that the probable answer is in the flamingos' breeding behaviour. The young are dependent for up to 12 weeks; the adult drips crop milk into their bills and needs good vision of the bill to accomplish this without wasting the precious milk. In contrast, shovellers have precocious young so do not need to have accurate bill sight to feed them.

I still don't know how I appear to the blackbird on my bird table. What I do know, bearing in mind this talk, is that its vision is admirably adapted to its specific needs to eat, to avoid being eaten and to breed successfully, and that its vision is knitted to its other senses in a specific 'blackbird' way. This fascinating talk made me realise that the relationship between a bird's vision and its behaviour is far more complex than I could have imagined and (I like this) in many species it evades predictability.

Penny Avant

*Andre Rocheaud-Duvignon in "Les yeux et le vision Vertébrés", 1943.