Research reveals that birds use optic flow cues to guide flight

October 28 2011

(PhysOrg.com) -- The beauty and majesty of birds in flight has long captured the attention of artists and photographers.

Now researchers at UQ's Queensland Brain Institute (QBI) have unlocked the secrets of how birds avoid collisions as they soar, swoop, dive, glide and engage in other aeronautic manoeuvres.

The grace of birds in even cluttered environments is all down to their perception of something called optic flow, says lead researcher Dr. Partha Bhagavatula.

“Our findings show, for the first time, that birds regulate their speed and negotiate narrow gaps safely by balancing the speeds of image motion, or optic flow, that are experienced by the two eyes,” says Dr. Bhagavatula.

In order to undertake the study, researchers trained budgerigars to fly through a seven-meter corridor.

Researchers then lined the corridor with different combinations of thick black horizontal and vertical stripes and filmed the budgies' flight trajectories.

They found that birds flew down the center of the corridor when optic flow cues were balanced (with identical, vertical stripes on either side of the corridor) but more closely towards one wall or another when these

cues were unbalanced (such as when one wall was lined with horizontal stripes and the other with vertical stripes).

The birds flew faster when the tunnels were lined with horizontal stripes (rather than vertical stripes), indicating that they were using optic flow cues to regulate their flight speed.

Dr. Bhagavatula explains that because the birds naturally flew in a horizontal direction within the tunnel, horizontal stripes (parallel to the direction of flight) would provide only weak motion cues, whereas vertical stripes (perpendicular to the direction of flight) would provide strong motion cues.

While similar flight behaviours have previously been demonstrated in honeybees, bumblebees and flies, this is the first time the use of optic-flow signals has been demonstrated in birds.

The findings suggest that some of the principles that underlie visually-guided flight may be shared by all diurnal flying animals, says Professor Mandyam Srinivasan, head of the laboratory.

According to Professor Srinivasan, these findings have important implications for robotics.

Specifically, the speed, agility and accuracy with which birds fly through a thicket of branches will teach scientists a lot about designing vision systems for guiding autonomous aerial vehicles through densely cluttered environments.

The research was published in the latest issue of *Current Biology*.

Provided by University of Queensland