

Bee Brains Lateralised

The discovery that the two sides of the human brain have very different roles was one of the major developments in our understanding of the brain. However, whether this is a primarily human attribute, or something common to other animals, has remained in dispute. Em/Prof Lesley Rogers of the University of New England has found evidence that the chicken fore-brain is lateralised, and has now collaborated in a study finding evidence for lateralisation in the brains of honeybees.

Bees develop a proboscis extension reflex that is similar to Pavlov's salivating dogs, whereby the bees extend their proboscis when smelling odours they have come to associate with food. Rogers taught bees she found on the grevillea bush outside her laboratory to associate lemon with food and vanilla with salt.

Rogers then coated one antenna in latex and presented the other with each smell. She found that shortly after the initial lesson most bees remembered well with their right antenna – that is, they extended their proboscis for lemon but not vanilla when the right antenna was uncovered. However, bee memory was weaker with the left antenna – more bees were interested in lemon than vanilla, but still more showed no proboscis extension at all.

A day later the pattern was completely different. Now almost all the bees using their left antenna remembered that lemon meant food. However, the right antenna did barely better than random. The longer the time delay, the better the left antenna did while the right got worse with time, with the crossover point at about 3 hours.

Surprising as these findings may appear they fit with studies



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showing that birds' recall shifts from one side of the brain to the other with time. In a paper published in *PLoS ONE*, Rogers and a colleague suggest: "Perhaps the shift from one antenna to the other allows use of the right antenna to learn about new odours without interference from odour memories in long-term stores".

Previous studies of lateralisation in invertebrates have shown tendencies to use legs on each side of the body differently, resembling human left and right-handedness, and for a preference to circle clockwise or anticlockwise depending on the species involved.

The *PLoS ONE* paper notes: "These findings seem to call for remarkable parallel evolution, and suggest that the proper functioning of memory formation in a bilateral animal, either vertebrate or invertebrate, requires lateralisation of processing".

Early Diagnosis for Brain Diseases

Early symptoms of Huntington's disease, such as clumsiness and memory loss, are often only recognised in hindsight. Now research at the Howard Florey Institute has found that diffusion Magnetic Resonance Imaging (MRI) can reveal degeneration in the white matter connecting different parts of the brain.

Diffusion MRI tracks the movement of water through the brain, enabling mapping of white matter that was previously impossible in living patients. "Our discovery could allow researchers to test therapies even before symptoms appear," says PhD student Ms India Bohanna, who hopes that new knowledge about the early effects of Huntington's disease will guide the search for drug treatments.

Huntington's disease is hereditary. The presence of the gene causing it is often detected a decade before serious symptoms emerge, giving time for repeated observations to track the early progress of the disease.

It was once thought that nothing could influence the progression of Huntington's, but some research suggests that physical and mental exercise may delay its onset (*AS*, March 2008, p.14; March 2007, p.14), at least in mice.

The work on diffusion MRI was presented to the 14th Meeting of the Organisation for Brain Mapping held in Melbourne in June.

A separate study at Melbourne's Austin Hospital has found that Positron

Emission Tomography (PET) scans can identify the beta-amyloid plaques associated with Alzheimer's disease 18 months earlier than previous techniques. The scans adapt an American technique used to confirm Alzheimer's where symptoms were already observed.

Although there is no cure for Alzheimer's disease, early intervention can delay the onset of symptoms. "Early presymptomatic diagnosis is an essential development which will allow us to test new disease-modifying therapies with the aim of delaying the onset of Alzheimer's disease in susceptible individuals," said Prof David Ames of the University of Melbourne's Department of Psychiatry.