Abstractions

FIRST AUTHOR

As social creatures, humans must be able to distinguish allies from adversaries. Adult humans rapidly and unconsciously evaluate others on both behaviour and physical features. But can infants do the same? Kiley Hamlin, a graduate student at Yale University, and her colleagues set out to answer this question using puppet shows depicting helping and hindering behaviour. On page 557, they report that even 6-month-old infants have a surprisingly uniform ability to choose 'good' guys over 'bad'.

Why study infant social skills?

Infants have an 'untouched' nature — they are pre-linguistic and have been explicitly taught very little — so they can give us a sense of the underlying capabilities of humans. Adults are automatic evaluators of others' behaviour. If this evaluation is so pervasive in adults and essential for survival in a social world, we proposed that infants should be able to do it too. But, until now, nobody has reported any work in children younger than three years old.

Did you find what you expected?

We were intrigued by the dissociation we found between infants' ability to predict others' social preferences (indicated by their looking time) and the infants' expression of their own preferences (indicated by their reaching behaviour). We found that infants have their own strong preferences before they are able to predict what others should prefer.

What was the biggest surprise?

We were shocked by the strength of the responses. We thought infants would be sensitive to the behaviour of others, but didn't anticipate the extent of this. Infant research rarely achieves anywhere close to a 100% response rate. We used physically neutral 'puppets' — circles, squares or triangles with affixed eyes — to role play the behaviours. And we expected some infants' shape or colour preferences to influence their choice, but, in our experiments, almost every single baby chose to play with the helper puppet over the hinderer after watching their behaviour.

If infants can distinguish good and bad, how does ugly factor in?

Infants are definitely savvy. They are always evaluating other people. There's a lot of research showing that babies prefer to look at attractive over unattractive people. In addition to evaluating others on the basis of surface characteristics, however, our work shows that they also base decisions on internal characteristics. But we don't yet know how they integrate these features — in other words, how they would rank an 'ugly helper'. ■

MAKING THE PAPER

Jared Leadbetter

Termite gut bacteria produce a wealth of wood-degrading enzymes.

When Jared Leadbetter travelled to Costa Rica in May 2005, it wasn't for the orange and blue poison arrow frogs, the butterflies with wings the size of saucers or the squirrel monkeys. Leadbetter, an environmental microbiologist at the California Institute of Technology in Pasadena, went for the termites.

One morning, he and some colleagues hiked into the Bosque Lluvioso forest near the town of Guápiles and quickly found what they were looking for — a basketball-sized termite nest attached to a tree trunk. Using a machete, Leadbetter took a slice of the nest and transported it and its inhabitants, the tropical *Nasutitermes* termites, to Costa Rica's National Biodiversity Institute. There he dissected almost 200 termites until well into the night.

Termites are famous for their wood-degrading abilities, and are aided in this effort by a gut-dwelling community of microorganisms. The microbes' activities are key to environmental-carbon turnover, and such microbes have recently been identified as a potential source of biochemical catalysts for turning wood into biofuels. Although termites have been studied for a century, information about the specific roles the host and the microbiota have in the degradation of plant biomass is scarce.

Leadbetter, who has been studying wood-feeding termites and their gut microbes since the early 1990s, travelled to Costa Rica in search of a termite unlike those he typically collects from fallen ponderosa pines in Los Angeles. The gut communities of Californian termites contain protozoa, whereas the guts of most tropical termites are rich in bacteria. Leadbetter wanted to avoid protozoa-rich termites, because he planned to sequence the genomes of termite hindgut microbiota. "Protozoa have huge genomes, and much of their DNA doesn't encode the genetic information used to make enzyme catalysts," he explains.

The tropical quarry proved a successful model. Leadbetter and his collaborators' metagenomic analysis of an area of the termite hindgut known as the P3 section (see page 560) revealed a large set of genes encoding enzymes that break down cellulose and xylan, two of the main polysaccharides found in wood. The researchers found that more than 250 species of bacteria live in this one-microlitre environment.

"For the first time, we have shown that all those bacteria in the gut encode a diversity of genes and enzymes that may have a role in the initial dismantling of wood," says Leadbetter. "The story is far from being over, but this is a real exclamation point. There aren't just a few, but hundreds of genes involved."

Among the organisms Leadbetter found in the termite's hindgut was a high concentration of spirochetes — helical bacteria that are usually associated with disease. The high density of beneficial spirochetes seen in these termites is rare, if not unheard of, in other environments, and until now little was known about the breadth of their roles in symbiosis. Leadbetter's research implicates spirochetes in the initial hydrolysis of wood polysaccharides, making them a crucial part of the termite's digestive machinery.

"There are different compartments in the gut that will have different microbial communities and may have a whole different story to tell," says Leadbetter. "Biology remains on the frontier. When you think about how much we still have to discover it can either be imposing or exciting. I find it to be both." ■

FROM THE BLOGOSPHERE

How are your mathematics skills? The Internet magazine *Plus*, which exposes readers to the beauty and the practical applications of mathematics, is organizing a science-writing competition, open to new writers from anywhere in the world who can explain a mathematical topic or application they think people need to know about. Further details of how to enter and the prizes can be seen at *Plus* (http://www.plus.maths.org/competition/). The deadline is 31 March 2008.

Plus has also teamed up with NPG to bring maths to the Nature Network (http://network.nature.com/forum/mathematics). Nature Network is a stage for science discussion that allows scientists to meet, interact, comment on the latest news, debate current topics or exchange information. Members can create groups for their own labs or organizations, or for their own subject area. *Plus* has launched a mathematics forum to provide a platform "for anyone who wants to discuss maths, whether it's actual maths, maths teaching, the portrayal of maths in the media, or good and bad maths content elsewhere on the internet." ■

Visit Nautilus for regular news relevant to *Nature* authors ▸ http://blogs.nature.com/nautilus and see Peer-to-Peer for news for peer-reviewers and about peer review ▸ http://blogs.nature.com/peer-to-peer.

©2007 Nature Publishing Group