

Baby talk and brain development

Women intuitively help babies learn to talk by adjusting their own speech patterns. Not only that, but cats and dogs get special treatment too. Denis Burnham and his team at the University of Western Sydney, Australia, have found that women adapt their speech to suit the social, emotional, and linguistic needs of their audience.

Burnham studied the way that women talk to adults, babies, and pets by recording the three core components of their speech patterns: pitch (frequency), affect (emotion), and vowel hyperarticulation (exaggeration). Talk directed at babies, cats, and dogs is characterised by high levels of pitch and affect (*Science* 2002; 296: 1435). “However”, says Burnham, “[the way] parents talk to infants and pets differs in one important aspect—in talk to infants, the vowels are exaggerated and clearly distinguished from one another. Heightened pitch and affect in the voice are appropriate for dependent beings who we love, such as infants and pets, and vowel hyperarticulation is appropriate for a being we perceive as linguistically competent—infants.”

Burnham believes that vowel hyperarticulation serves as a didactic tool for infants, helping them to learn to speak. However Sarah Hawkins (University of Cambridge, UK) is less convinced.

“Whether baby talk really helps babies learn is a bit of a moot point”, she says. “It almost certainly plays some sort of helpful function, if only in attracting and keeping the baby’s attention on the speaker, but it may not do a great deal more than that. Much of the speech they hear is not baby talk, and they do seem to learn a lot from what is not directed at them.”

A second paper in *Science* links linguistic ability with neurological development (*Science* 2002; 296: 1476–79). Bradley Schlagger from the Washington University School of Medicine (St Louis, MO, USA) found that as children mature, different parts of the brain are involved in certain language-related tasks. This has implications for the development of treatment strategies for paediatric neurological disorders.

Schlagger’s group used fMRI to compare the brains of adults with children (aged 7 to 10 years) while they did single word-processing tasks, such as naming opposites. The tasks

highlighted two brain regions in the left frontal and left extrastriate cortex, known to be involved in language processing and which develop substantially between childhood and adulthood. Matching results for age and accuracy, Schlagger found that specific subregions of the two areas were involved in an age-related performance. Adults used a specific subregion in the frontal cortex whereas children used more posterior processing regions.

The results suggest that, compared with adults, children’s brains process certain language tasks differently, and that some language-related components of the brain are still developing during early school years. “A fundamental objective of neuroscience research is to understand how the human brain develops”, Schlagger commented. “We need such knowledge to understand how normal brains develop and to learn what goes wrong in paediatric neurology-related disorders. Only then can we develop clinical interventions to treat these children.”

Helen Pilcher

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Look who’s talking now

Are we nearly there yet?

Two neuroscientists have described a group of neurons in the monkey anterior cingulate cortex that become increasingly active as the animal gets nearer to completing a series of tasks. Overactivation of these same neurons might contribute to obsessive-compulsive disorder or drug abuse.

Munetaka Shidara (National Institute of Advanced Industrial Science and Technology, Japan) and Barry Richmond (NIMH, Bethesda, MA, USA) trained monkeys to release a lever when a spot on a computer screen changed from red to green. When the animals successfully completed the task the spot turned blue, and a grey bar on

the screen got one shade brighter. After successfully completing a preset number of trials, the monkeys were given a reward (*Science* 2002; 296: 1709–11). “We found that the anterior cingulate neurons responded stronger as the reward approached, which indicates that the signal is related to reward expectancy”, explains Shidara.

“If you’re working toward a distant goal, you must keep working even if you don’t like what you are doing”, adds Richmond. “It makes sense that there is a signal that varies with degree of reward expectancy that keeps you on-task performing a long sequence of behaviours. What we’re

studying are the dynamics of this situation: the ongoing tension between the desirability of reaching the goal and the hard work needed to achieve it.”

“We speculate that the signals in the anterior cingulate will be disrupted in patients with disorders of motivation and reward expectation such as obsessive-compulsive disorders and drug abuse”, says Shidara. “Considering our results and other fMRI reports, there is a possibility that these disorders are due to abnormally high activity of the anterior cingulate neurons irrespective of the situation.”

James Butcher

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