Report of 12 April 2018 Meeting
Royal Society
Southern Highlands Branch

Speaker: **Professor Anne Cutler FRS**
Research Professor, MARCS Institute for Brain, Behaviour and Development, Western Sydney University.
Emeritus Director, Max Planck Institute for Psycholinguistics. Nijmegen, the Netherlands.

Topic: **Language in the first year of life (Babies are working harder than we thought)**

Babies are born without predisposition to a particular language; whatever language they hear, that is the language that they acquire. In other words, the processes in the baby brain must be language-universal. Adults listen extremely effectively to speech in their native language, drawing on processes that would work poorly with other languages. We therefore conclude that speech processing in the adult brain is language-specific. Professor Anne Cutler posed the question of how a baby's language universality becomes the adult's language specificity, before presenting her research processes and findings to the intrigued 48 person audience.

Several of the experiments that Cutler described related to speech in an infant 6-9 months old. Infants hear mostly continuous speech, only 8.67% of what they hear being isolated words. Speech is continuous, fast, variable and non-unique. Everything in speech recognition follows from that. In the experiments, it was obvious that infants turned their heads longer to hear speech input that they preferred, with 7 month old English-learners preferring passages that contained words that they had just heard in isolation. It is clear that infants can segment running speech, in other words they are easily able to spot the familiar words in continuous speech.

Other results from Cutler's experiments showed that 9-month old English-learners prefer typical words (pliant, rector) where the emphasis is on the first syllable, rather than non-typical words (imply, correct) where the stressed first syllable has been moved to the end of the word. An important finding from the segmentation studies was that two-year-olds who had participated in segmentation studies as infants showed a far greater vocabulary size than those who had not. This was shown to be true in numerous languages in dozens of Head-Turn studies.

One of the techniques used by Cutler's team to test infant speech perception involved the use of Event Related Potentials (ERP), where the child's head was covered with a cap carrying numerous electrodes. To start a vocabulary, infants have to find words in running speech, in other words to show segmentation ability. With the use of ERPs, the team could look at the age at which segmentation appears, the amplitude of the effect in

the brain trace and also the nature of that effect. This data was invaluable in correlating these measures with a child's demonstrated language skills.

Towards the end of her lecture, Anne Cutler presented her ground-breaking research on the language development of children who had been born to non English-speaking mothers and then adopted by English-speaking parents. The process of acquiring a language starts automatically before birth in the third trimester. The baby is able to separate sounds reaching the womb from various sources such as the mother's voice. This new research has found that the early language in the adoptees can be subconsciously retained even when they can no longer remember the learning experience.

Professor Cutler's conclusion was that when we look at a baby resting in its cot, we are seeing the human mind at its finest. The tiny child has the ability to generalize across instances, to see the over-arching patterns, and to store this abstraction for constructing future expectations. All in full use, even in the first year of life.

Anne Wood FRSN