

Prof. Dr. Dr. h.c. Angela D. Friederici

Director, Department of Neuropsychology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig

How did the human brain develop its unique capacity for language and speech?

The evolution of language is still an unsolved question. Today, however, we know about some crucial differences between the human and non-human primate brain. This difference lies, in particular, in how certain brain regions are connected via white matter fiber bundles by which information is transmitted.

Essentially, there is a fiber bundle connecting the two language-related brain regions. This fiber bundle is very strong in the human brain, but only weakly present in the non-human brain.

Your research focuses on language acquisition in infants. How early does this process start, and what methods do you use to measure these abilities in infants before they are able to speak?

Language acquisition starts before birth since a fetus' auditory system is already well developed by the final weeks of pregnancy. Thus, it can process speech-induced auditory information that reaches the fetus in the uterus – albeit in a filtered way. Infants' language abilities can be tested shortly after birth by measuring their brain activation in response to speech presented to them.

An infant's ability to detect complex rules in language outshines that of adults. Why is it easier for young children to learn foreign languages?

For an infant, it is quite easy to automatically detect phonological and syntactic regularities in auditory speech input without cognitive control. Adults, on the other hand, try to understand what has been said using more controlled strategies. This difference in processing has a neurobiological basis since controlled processes are located in the prefrontal cortex. This region of the brain is well developed by adolescence, but not yet during infancy, which helps explain the automatic processing of language in young children.

How does the brain benefit from multilingualism?

The learning of more than one language during development has several advantages. First, since the brain's structure and function develops and is informed in close conjunction with language input, it remains more flexible when confronted with more than one language. Second, it has been shown that infants who learn more than one language are also more flexible in shifting their attention from one area of focus to another. Third, the use of more than one language keeps the brain and cognitive system more flexible across the entire life span.

Canadian studies suggest that Alzheimer's and dementia are diagnosed later for bilinguals than for monolinguals, indicating that knowledge of a second language may help individuals prolong cognitive health. What is your opinion about these findings?

This data is highly relevant and can be connected to the topics addressed under question four. The benefits of multilingualism have been documented in old age. The actual degree of these benefits, however, depends on the active use of more than one language during both adolescence and old age.