

Plasticity of early neural language processes

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We speak and understand speech with a remarkable speed, while we are concurrently able to think: we plan what we say next and analyze what we hear during a conversation. This is likely to be based on automatic neural speech processes which free capacity for these complex functions. There is ample neuroscientific evidence for such automatic analysis of speech. Speech memory traces, acquired for the native language in early childhood, are activated irrespective of whether or not we attend to the speech input. These memory traces are malleable. New memory representations emerge even after childhood through foreign language learning. Accurate speech sound traces are pertinent also for fluent reading. Their weakness and poor connections to print were proposed to be one of the primary causes of developmental dyslexia. This theory is supported by results showing that training including auditory/speech or audiovisual stimuli improves reading skills and facilitates neural processes in dyslexia. The development of speech and sound memory traces can be influenced even before birth. It was recently shown that prenatal exposure to novel sound elements in word-like stimuli results in memory representations for these stimuli, which can be detected after birth by recording neural responses. Furthermore, it was found that memory traces formed before birth may persist for several months after birth. Evidently, the accuracy of the automatically operating speech memory traces is vital for language functions, and by investigating these memory processes, we can illuminate even the neural plastic mechanisms of the brain in early infancy.