

**The Elucidation of Sign Language Acquisition Mechanism  
Based on the Linguistic Function of the Brain**

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**【Outline of survey】**

The core issue in the linguistic function of the brain is acquisition of the native language. However, the main process of language acquisition occurs within several years after the birth, and intervention in this process is forbidden on ethical grounds. In addition, the functional brain imaging of infants is impeded by the physical restraints necessary to control head and body movement. In order to overcome this problematic situation, we would like to suggest a new line of research designed to reveal the sign language acquisition mechanism. In Japan at present, it is not adequately understood that sign language is the only natural native language for children with hearing impairment. Therefore, in order to protect the language rights of these children, it is necessary that we intervene in such a way that they have the opportunity to acquire sign language. Considering that language ability is the basis for all forms of study and education, there is no doubt that establishment of language ability itself is the key to resolve the fundamental problem. Therefore, we would like to elucidate the linguistic function of the brain in the language development of children with hearing impairment in order to clarify the processes and mechanisms of syntax, semantics, and phonemes (e.g. rhythm in sign language), and to establish the causal relations between these various factors and learning abilities. The goal of this study is to combine the development of an objective method, which can evaluate both language and learning abilities of Deaf children, and the measurement of the brain activities of native signers and learners of Japanese Sign Language with fMRI (functional magnetic resonance imaging) or MEG (magnetoencephalography), thereby allowing quantitative assessment of the functional localization of language processing and the degree of learning accomplishment.

**【Expected results】**

If a child with hearing impairment does not live in an appropriate linguistic environment, not only will the child's language development be retarded, but the child's overall learning will be delayed, with the result that he or she may not be able to acquire or develop the intelligence necessary for life in society. We can expect that it will be demonstrated empirically that hearing impaired children, even those with severe hearing impairment, can acquire linguistic ability and learning activity using sign language in the normal developmental process, if they are allowed to acquire Japanese Sign Language as their native language as early as possible. This study is the first step for data accumulation toward the realization of the education and life support program for people with hearing impairment through both a functional brain imaging study and an investigational study tolerable to the detailed statistical assessments.

**【References by the principal investigator】**

- Sakai, K. L.: Language acquisition and brain development. *Science* **310**, 815-819 (2005).
- Sakai, K. L., Tatsuno, Y., Suzuki, K., Kimura, H. & Ichida, Y.: Sign and speech: Amodal commonality in left hemisphere dominance for comprehension of sentences. *Brain* **128**, 1407-1417 (2005).

**【Term of project】** FY2008—2012

**【Budget allocation】**

**113,100,000 yen** (direct cost)

**【Homepage address】**

<http://mind.c.u-tokyo.ac.jp/>