

THE LANGUAGE CONNECTION

Opening the brain's grammar toolbox

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Recent research conducted by Kuniyoshi Sakai might seem, at first glance, similar to many other studies in the field of neurolinguistics that employ magnetic resonance imaging technology to determine certain functions of the brain. But, actually, his work is unique in several respects.

One of the distinctive parts of Sakai's study was to repeatedly ask his subjects to examine both grammatical and ungrammatical Japanese sentences, such as the following:

■ *Taro wa Saburo ga kare o homeru to omou.*
(Taro thinks Saburo praises him.)

■ *Kare ni Taro ni Saburo ni omou homeru to.*
(him Taro Saburo thinks praises.)

As a result, the 39-year-old associate professor in cognitive science at Tokyo University discovered that a particular area in the left prefrontal cortex of the brain seemed to be particularly active among subjects during the study. This suggests that this section of the brain is specifically involved in comprehending grammatical structure. Sakai described this finding as "something new" in the area of neurolinguistics and cognitive science.

"The greatest mystery we face today is what truly makes human beings intellectually different from other species," Sakai said in an interview with The Daily Yomiuri.

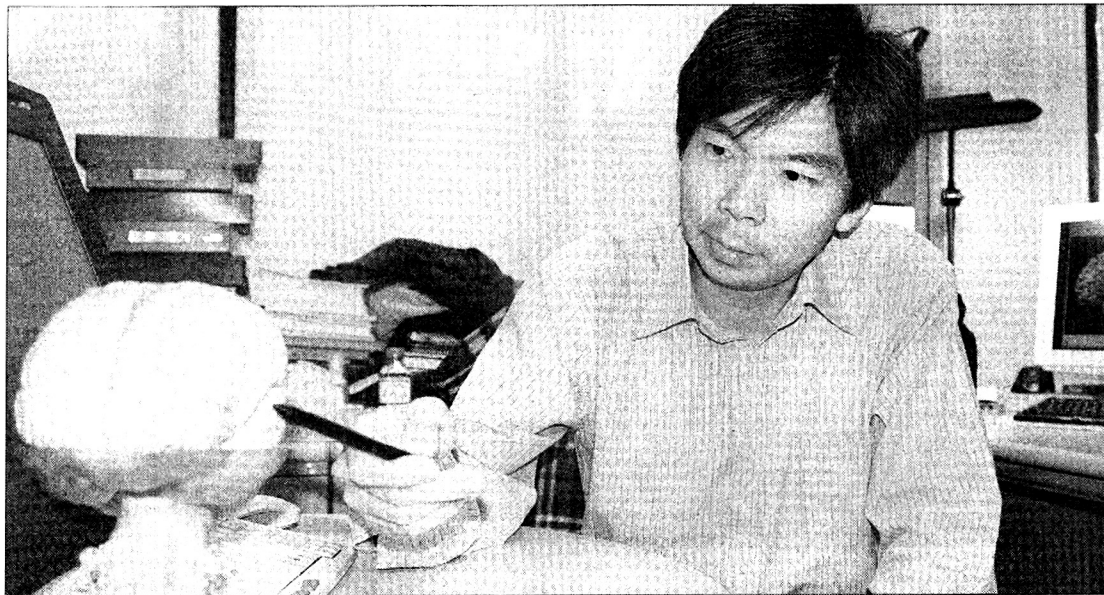
"In terms of language usage, chimpanzees may be able to link a particular word to a particular concept. But human beings can construct words in a way to make a meaningful sentence—what we call a grammatical sentence—and this is a point peculiar to humans," he said. Sakai claims his research provides firm scientific support for this assertion.

Sakai's investigation also led him to the discovery that the region in the left prefrontal cortex exhibits specific activity when subjects are required to comprehend and produce grammatical sentences, whereas the area in question does not exhibit any activity at all when subjects simply have to memorize words.

This attempt to compare the brain's function of language comprehension to the function of memorizing words is another distinctive aspect of Sakai's research in comparison to the work of others in his field.

"Although many researchers in the past have claimed humans use some particular areas of their brains for language comprehension, they have fallen short of proving they are really unique to the function of comprehending grammatical sentences," he said.

Sakai's achievement in the neurolinguistics field has contributed further evidence to the existence



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Tokyo University Associate Prof. Kuniyoshi Sakai points to a model brain while explaining the results of his recent research at his office at the university in Meguro Ward, Tokyo.

of "universal grammar," as espoused by globally renowned linguist Noam Chomsky decades ago.

According to Chomsky, professor at the Massachusetts Institute of Technology, universal grammar is a set of fundamental principles and rules common to all human languages that people innately possess, enabling them to acquire language when they are children.

"It's accepted by everyone that each language has its own rules, although we may not be explicitly aware of the rules of our own language," said Sakai, who first became interested in linguistics after an encounter with Chomsky in Boston when he was studying there.

"If universal grammar does exist, it is my job to find it out where it is in our brains," said Sakai, who appears to have made a big step toward achieving that goal.

Second language acquisition

Beside his attempt to support the great linguist's theory, Sakai is now seeking to use his findings to add weight to the saying, "There's no royal road to learning," particularly when it comes to a second language.

"When we study a foreign language, in most cases we start by learning and memorizing words, working hard to understand what those words represent," Sakai said.

"But the most important thing is to actually learn how to arrange those words in a grammatical way, which is achieved through the activity of a specific part of our brain, as my research shows."

Sakai said the secret behind bilingualism was the Language Acquisition Device (LAD).

The LAD is a function believed to exist in human brains that allows people to convert an input of words into an output of grammatical sentences. It is also thought that the brain's LAD starts to develop at the age of 1 or 2 years, Sakai explained. To logically analyze the function of the LAD, many contemporary researchers adopt the theory of universal grammar.

"So-called bilingual people, having grown up in an environment in which people around them speak different languages, establish an LAD that can work with both languages," he said. This allows them to produce well-formed sentences without any effort, he added.

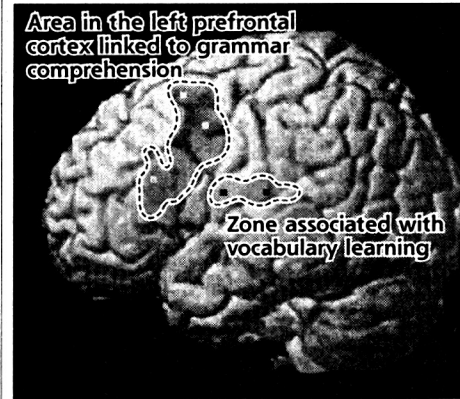
By the time such children are old enough to realize they are using two distinct languages, Sakai said, they have already developed LADs that will not mix up the grammar rules unique to each language.

But how can later learners of a second language develop an LAD that will embrace a new grammar? Sakai's answer is simple: "Pay your dues by exposing yourself to a massive flow of new data from the foreign language you are studying," he said. He suggested that listening to tapes eight hours a day was the kind of exposure required to provide sufficient stimulation of one's LAD.

Sakai warned that learners of English should escape the illusion that language education can be achieved by focusing on daily conversation. "Simply learning greetings by heart without ex-

Neurolinguistic research

Cross section of the brain



Courtesy of Kuniyoshi Sakai

aming their meaning will not sufficiently stimulate our own LAD," he said.

Such a learning style ultimately reduces the amount of input a human brain receives, he argued. "It's like karaoke, merely singing to the words that pop up on the screen."

One of Sakai's recommendations is for English learners to write extensively about their daily life in English and ask native speakers to check their sentences. This, he believes, is a good way to stimulate one's LAD by increasing the input-output flow.

Sakai said his own experience had made him realize the difficulty of mastering a second language, a feat that can never be achieved without deliberate effort on the part of the learner.

About two years of academic life in the United States, he said, had not allowed him to reach a high level of proficiency in English. He added that he was still unable to keep up with conversations among native speakers on a bus or catch the announcements of a bus driver.

Sakai said, nonetheless, that his future research may help to lighten the burden of learning a language, at least a little.

"A variety of ways to learn a second language have been introduced into today's educational sphere and we need to evaluate each method by analyzing its consequences to see how much it helps us to improve at a language," Sakai said. "What I want to stress here is that we have to recognize our brains are making certain changes during the process of learning a language no matter what methodology we employ."

"If we can improve the mechanism of this process, it will be possible to offer the most effective learning method for each person, if not the most effective for all learners."