

Familiar and newly learned words are processed by the same neural networks in the brain

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Our vocabulary continues to grow and expand even in adulthood. Just ten years ago, the word 'blog' did not yet exist - and now we no longer remember when we heard this word for the first time or when we learned its meaning. At some stage new words become just as familiar to us as words we have learned earlier. One of the areas of interest in the Academy of Finland's Neuroscience Research Programme (NEURO) is how the process of learning new words is reflected in the function of the brain.

The new research evidence emerging about how the brain processes language and its different levels has important application among other things in the development of language teaching.

In one of the experiments conducted in the NEURO programme, participants learned the name and/or purpose of 150 ancient tools. They had never heard these words before. The subjects' [brain function](#) was measured by means of magnetoencephalography during the naming of the tools, both before and after the learning period.

The results show that the brain uses the same neural networks to process both familiar and newly learned words. The names of objects were processed in the left temporal and [frontal lobe](#) within half a second of showing the image of the tool to the subject. "If the subject had only recently learned the name of the tool, the the naming process induced an

activation that was just as strong or stronger than the activation induced by the image of a familiar object," says Academy Professor Riitta Salmelin, HUT Low Temperature Laboratory, who is in charge of the research.

According to Salmelin the learning of the meaning of ancient tools did not cause corresponding clear differences in the function of the brain. In other words, it seems that the processing of meanings in the brain differs essentially from the processing of names. On the other hand, the performance results indicated that new definitions were learned even faster than new names.

How are learned words retained?

The research team are now working on a follow-up study to explore the retention of learned words. Is it possible to detect in brain activation some specific phenomenon that predicts good retention of learned knowledge up to several months after learning?

"We are also conducting a separate series of experiments to find out how our brain learns phonetic structures and, on the other hand, how the brain learns to identify letter combinations that are typical of a certain language," Riitta Salmelin explains.

Another area of interest in the ongoing study is the role of grammar in language learning. The focus here is to explore how the brain learns to use the vocabulary and grammatical structure of an experimental miniature language.

More information: Results from the project have recently been published in *Human [Brain Mapp](#)*; 30: 976-989 (Hultén et al.)

Source: Academy of Finland

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