Scientists in sleep-wake tests decode dreams

October 29 2012, by Nancy Owano

What's in a dream? For Yukiyasu Kamitani, the question is important. He has been testing how dreams relate to brain activity and what really is the function of dreaming, He leads a team of researchers at the ATR Computational Neuroscience Laboratories in Kyoto, Japan. The labs work toward exploring the function of the brain through computational neuroscience.

Kamitani's findings were presented at the Society for Neuroscience in New Orleans earlier this month. The researchers suggested that dreaming and visual perception share similar neural representations in the higher-order visual areas of the brain.

Other scientists have found their research exciting. Their suggestion that dreaming involves some of the same higher-level visual brain areas that are involved in visual imagery draws much of the interest.

The team used functional neuroimaging to scan the brains of three people as they slept. The participants' brain waves were recorded with electroencephalography (EEG). The team monitored electrical patterns in the brain waves, so that they could wake them up whenever the signals indicated that they had begun dreaming.

The researchers woke the participants whenever they detected the pattern of brain waves associated with sleep onset, asked them what they had just dreamed about, and then asked them to go back to sleep. The process of awakening participants and asking what they dreamed about before being allowed to go back to sleep was repeated across several

days. The Japanese researchers managed to decode the dreams.

While some of the dreams were out of the ordinary, most involved daily experiences with common themes, such as a car and computer. Then pictures were gathered that represented each category.

The participants were asked to view the images and their brains were scanned again. This second set of brain activity data with the recordings that were made just before the volunteers awoke told the researchers that there were distinctive patterns in three key brain regions which help us process what our eyes see. They found that activity in other brain regions with more specialized roles in visual processing varied depending on the content of the dreams

The researchers analyzed activity in brain areas V1, V2 and V3, which are involved in the earliest stages of visual processing and encode basic features of visual scenes, such as contrast and the orientation of edges. They also looked at regions involved in higher-order visual functions, such as object recognition. They built a computer model to predict whether or not each of the selected themes was present in the participants' dreams. "In this study we were able to decode only basic object category information, but the method could be extended to decode more dynamic and emotional aspects of dreams," Kamitani said. "Our study shows that during dreaming, some brain areas show activity patterns similar to those elicited by pictures of related contents."

Using a database of picture-elicited brain activity and a pattern recognition algorithm, he said it is possible to read out, or decode, what a person might be seeing from brain scans during dreaming.

More information: *Neuron* 60, 915–929 (2008).