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How the brain routes traffic for maximum alertness

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A new UC Davis study shows how the brain reconfigures its connections to minimize distractions and take best advantage of our knowledge of situations.

"In order to behave efficiently, you want to process relevant sensory information as fast as possible, but relevance is determined by your current situation," said Joy Geng, assistant professor of psychology at the UC Davis Center for Mind and Brain.

For example, a flashing road sign alerts us to traffic merging ahead; or a startled animal might cue you to look out for a hidden predator.

When concentrating on a specific task, it's helpful to reconfigure brain networks so that task-relevant information is processed most efficiently and external distractions are reduced, Geng found.

Geng and co-author Nicholas DiQuattro, a graduate student in psychology, used functional magnetic resonance imaging to study brain activity in volunteers carrying out a simple test. They compared their results to mathematical models to infer connectivity between different areas of the brain. The study appeared in the Dec. 7 issue of the *Journal of Neuroscience*.

The subjects had to look for a letter "T" in a box and indicate which way it faced by pressing a button. They were also presented with a "distractor": another letter T in a box, but rotated 90 degrees.

The distractor was either similar in appearance to the target, or brightened to be more attention-getting.

Subjects did better in trials with an "attention-getting" distractor than a less obvious one, and lit up specific areas of the brain accordingly.

The new work shows that the brain doesn't always "ramp up" to deal with the situation at hand, Geng said. Instead, it changes how traffic moves through the existing hard-wired network -- rather like changing water flow through a network of pipes or information flow over a computer network -- in order to maximize efficiency.

Provided by University of California - Davis

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