Training can improve multitasking ability

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Paul Dux

(PhysOrg.com) -- Training increases brain processing speed and improves our ability to multitask, new research from Vanderbilt University indicates.

"We found that a key limitation to efficient multitasking is the speed with which our prefrontal cortex processes information, and that this speed can be drastically increased through training and practice," says Paul E. Dux, a former research fellow at Vanderbilt, and now a faculty member at the University of Queensland, Brisbane, Australia and co-author of the study, which was published in the June 15 issue of the journal Neuron. "Specifically, we found that with training, the 'thinking' regions of our brain become very fast at doing each task, thereby quickly freeing them up to take on other tasks."

To understand what was occurring in the brain when multitasking

efficiency improved, the researchers trained seven people daily for two weeks on two simple tasks — selecting an appropriate finger response to different images, and selecting an appropriate vocal response (syllables) to the presentation of different sounds. The tasks were done either separately or together (multitasking situation). Scans of the individuals' brains were conducted three times over the two weeks using functional magnetic resonance imaging (fMRI) while they were performing the tasks.

Before practice, the participants showed strong dual-task interference—slowing down of one or both tasks when they attempted to perform them together. As a result of practice and training, however, the individuals became very quick not only at doing each of the two tasks separately, but also at doing them together. In other words, they became very efficient multi-taskers.

The fMRI data indicate that these gains were the result of information being processed more quickly and efficiently through the prefrontal cortex.

"Our results imply that the fundamental reason we are lousy multi-taskers is because our brains process each task slowly, creating a bottleneck at the central stage of decision making," says René Marois, associate professor of psychology at Vanderbilt University and co-author of the study. "Practice enables our brain to process each task more quickly through this bottleneck, speeding up performance overall."

The researchers also found the subjects, while appearing to multitask simultaneously, were not actually doing so.

"Our findings also suggest that, even after extensive practice, our brain does not really do two tasks at once," Dux says. "It is still processing one task at a time, but it does it so fast it gives us the illusion we are doing

two tasks simultaneously."

The researchers noted that although their results showed increased efficiency in the posterior prefrontal cortex, this effect and multitasking itself are likely not supported solely by this brain area.

"It is conceivable, for example, that more anterior regions of prefrontal cortex become involved as tasks become more abstract and require greater levels of cognitive control," Marois says.

Dux completed this study while conducting post-doctoral research at Vanderbilt. Michael Tombu, Stephenie Harrison and Frank Tong, all of the Department of Psychology at Vanderbilt, and Baxter Rodgers of the Vanderbilt University Institute of Imaging Science and Department of Radiology and Radiological Sciences also co-authored the study. Marois, Tombu, Harrison and Tong are members of the Vanderbilt Vision Research Center and the Vanderbilt Center for Integrative and Cognitive Neurosciences.

More information: www.cell.com/neuron/

Provided by Vanderbilt University (news : web)