

Study shows just listening to cell phones significantly impairs drivers

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Carnegie Mellon University scientists have shown that just listening to a cell phone while driving is a significant distraction, and it causes drivers to commit some of the same types of driving errors that can occur under the influence of alcohol.

The use of cell phones, including dialing and texting, has long been a safety concern for drivers. But the Carnegie Mellon study, for the first time, used brain imaging to document that listening alone reduces by 37 percent the amount of brain activity associated with driving. This can cause drivers to weave out of their lane, based on the performance of subjects using a driving simulator.

The findings, to be reported in an upcoming issue of the journal *Brain Research*, show that making cell phones hands-free or voice-activated is not sufficient in eliminating distractions to drivers. “Drivers need to keep not only their hands on the wheel; they also have to keep their brains on the road,” said neuroscientist Marcel Just, director of the Center for Cognitive Brain Imaging.

Other distractions, such as eating, listening to the radio or talking with a passenger, also can divert a driver. Though it is not known how these activities compare to cell phone use, Just said there are reasons to believe cell phones may be especially distracting. “Talking on a cell phone has a special social demand, such that not attending to the cell conversation can be interpreted as rude, insulting behavior,” he noted. A passenger, by contrast, is likely to recognize increased demands on the driver’s

attention and stop talking.

The 29 study volunteers used a driving simulator while inside an MRI brain scanner. They steered a car along a virtual winding road at a fixed, challenging speed, either while they were undisturbed, or while they were deciding whether a sentence they heard was true or false. Just's team used state-of-the-art functional magnetic resonance imaging (fMRI) methods to measure activity in 20,000 brain locations, each about the size of a peppercorn. Measurements were made every second.

The driving-while-listening condition produced a 37 percent decrease in activity of the brain's parietal lobe, which is associated with driving. This portion of the brain integrates sensory information and is critical for spatial sense and navigation. Activity was also reduced in the occipital lobe, which processes visual information.

The other impact of driving-while-listening was a significant deterioration in the quality of driving. Subjects who were listening committed more lane maintenance errors, such as hitting a simulated guardrail, and deviating from the middle of the lane. Both kinds of influences decrease the brain's capacity to drive well, and that decrease can be costly when the margin for error is small.

“The clear implication is that engaging in a demanding conversation could jeopardize judgment and reaction time if an atypical or unusual driving situation arose,” Just said. “Heavy traffic is no place for an involved personal or business discussion, let alone texting.”

Because driving and listening draw on two different brain networks, scientists had previously suspected that the networks could work independently on each task. But Just said this study demonstrates that there is only so much that the brain can do at one time, no matter how different the two tasks are.

The study emerges from the new field of neuroergonomics, which combines brain science with human-computer interaction studies that measure how well a technology matches human capabilities.

Neuroergonomics is beginning to be applied to the operation of vehicles like aircraft, ships and cars in which drivers now have navigation systems, iPods and even DVD players at their disposal. Every additional input to a driver consumes some of his or her brain capacity, taking away some of the resources that monitor for other vehicles, lane markers, obstacles, and sudden changes in conditions.

“Drivers’ seats in many vehicles are becoming highly instrumented cockpits,” Just said, “and during difficult driving situations, they require the undivided attention of the driver’s brain.”

Source: Carnegie Mellon University

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