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## Media multitaskers pay mental price, Stanford study shows

*Think you can talk on the phone, send an instant message and read your e-mail all at once? Stanford researchers say even trying may impair your cognitive control.*

BY ADAM GORLICK

Attention, multitaskers (if you can pay attention, that is): Your brain may be in trouble.

People who are regularly bombarded with several streams of electronic information do not pay attention, control their memory or switch from one job to another as well as those who prefer to complete one task at a time, a group of Stanford researchers has found.

High-tech jugglers are everywhere – keeping up several e-mail and instant message conversations at once, text messaging while watching television and jumping from one website to another while plowing through homework assignments.

But after putting about 100 students through a series of three tests, the researchers realized those heavy media multitaskers are paying a big mental price.

"They're suckers for irrelevancy," said [communication](#) Professor [Clifford Nass](#), one of the researchers whose findings are published in the Aug. 24 edition of the *Proceedings of the National Academy of Sciences*. "Everything distracts them."

Social scientists have long assumed that it's impossible to process more than one string of information at a time. The brain just can't do it. But many researchers have guessed that people who appear to multitask must have superb control over what they think about and what they pay attention to.

### Is there a gift?

So Nass and his colleagues, [Eyal Ophir](#) and [Anthony Wagner](#), set out to learn what gives multitaskers their edge. What is their gift?

"We kept looking for what they're better at, and we didn't find it," said Ophir, the study's lead author and a researcher in Stanford's [Communication Between Humans and Interactive Media Lab](#).

In each of their tests, the researchers split their subjects into two groups: those who regularly do a lot of media multitasking and those who don't.

In one experiment, the groups were shown sets of two red rectangles alone or surrounded by two, four or six blue rectangles. Each configuration was flashed twice, and the participants had to determine whether the two red rectangles in the second frame were in a different position than in the first frame.

They were told to ignore the blue rectangles, and the low multitaskers had no problem doing that. But the high multitaskers were constantly distracted by the irrelevant blue images. Their performance was horrible.

Because the high multitaskers showed they couldn't ignore things, the researchers figured they were better at storing and organizing information. Maybe they had better [memories](#).

The second test proved that theory wrong. After being shown sequences of alphabetical letters, the high multitaskers did a lousy job at remembering when a letter was making a repeat appearance.

"The low multitaskers did great," Ophir said. "The high multitaskers were doing worse and worse the further they went along because they kept seeing more letters and had difficulty keeping them sorted in their brains."

### Still puzzled

Puzzled but not yet stumped on why the heavy multitaskers weren't performing well, the researchers conducted a third test. If the heavy multitaskers couldn't filter out irrelevant information or organize their memories, perhaps they excelled at switching from one thing to another faster and better than anyone else.

Wrong again, the study found.

The test subjects were shown images of letters and numbers at the same time and instructed what to focus on. When they were told to pay attention to numbers, they had to determine if the digits were even or odd. When told to concentrate on letters, they had to say whether they were vowels or consonants.

Again, the heavy multitaskers underperformed the light multitaskers.

"They couldn't help thinking about the task they weren't doing," Ophir said. "The high multitaskers are always drawing from all the information in front of them. They can't keep things separate in their minds."


The researchers are still studying whether chronic media multitaskers are born with an inability to concentrate or are damaging their cognitive control by willingly taking in so much at once. But they're convinced the minds of multitaskers are not working as well as they could.

"When they're in situations where there are multiple sources of information coming from the external world or emerging out of memory, they're not able to filter out what's not relevant to their current goal," said Wagner, an associate professor of [psychology](#). "That failure to filter means they're slowed down by that irrelevant information."



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