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Brain, Interrupted

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TECHNOLOGY has given us many gifts, among them dozens of new ways to grab our attention. It's hard to talk to a friend without your phone buzzing at least once. Odds are high you will check your Twitter feed or Facebook wall while reading this article. Just try to type a memo at work without having an e-mail pop up that ruins your train of thought.

But what constitutes distraction? Does the mere possibility that a phone call or e-mail will soon arrive drain your brain power? And does distraction matter — do interruptions make us dumber? Quite a bit, according to new research by Carnegie Mellon University's Human-Computer Interaction Lab.

There's a lot of debate among brain researchers about the impact of gadgets on our brains. Most discussion has focused on the deleterious effect of multitasking. Early results show what most of us know implicitly: if you do two things at once, both efforts suffer.

In fact, multitasking is a misnomer. In most situations, the person juggling e-mail, text messaging, Facebook and a meeting is really doing something called "rapid toggling between tasks," and is engaged in constant context switching.

As economics students know, switching involves costs. But how much? When a consumer switches banks, or a company switches suppliers, it's relatively easy to count the added expense of the hassle of change. When your brain is switching tasks, the cost is harder to quantify.

There have been a few efforts to do so: Gloria Mark of the University of California, Irvine, found that a typical office worker gets only 11 minutes between each interruption, while it takes an average of 25 minutes to return to the original task after an interruption. But there has been scant research on the quality of work done during these periods of rapid toggling.

We decided to investigate further, and asked Alessandro Acquisti, a professor of information technology, and the psychologist Eyal Peer at Carnegie Mellon to design an experiment to measure the brain power lost when someone is interrupted.

To simulate the pull of an expected cellphone call or e-mail, we had subjects sit in a lab and perform a standard cognitive skill test. In the experiment, 136 subjects were asked to read a short passage and answer questions about it. There were three groups of subjects; one merely

completed the test. The other two were told they "might be contacted for further instructions" at any moment via instant message.

During an initial test, the second and third groups were interrupted twice. Then a second test was administered, but this time, only the second group was interrupted. The third group awaited an interruption that never came. Let's call the three groups Control, Interrupted and On High Alert.

We expected the Interrupted group to make some mistakes, but the results were truly dismal, especially for those who think of themselves as multitaskers: during this first test, both interrupted groups answered correctly 20 percent less often than members of the control group.

In other words, the distraction of an interruption, combined with the brain drain of preparing for that interruption, made our test takers 20 percent dumber. That's enough to turn a B-minus student (80 percent) into a failure (62 percent).

But in Part 2 of the experiment, the results were not as bleak. This time, part of the group was told they would be interrupted again, but they were actually left alone to focus on the questions.

Again, the Interrupted group underperformed the control group, but this time they closed the gap significantly, to a respectable 14 percent. Dr. Peer said this suggested that people who experience an interruption, and expect another, can learn to improve how they deal with it.

But among the On High Alert group, there was a twist. Those who were warned of an interruption that never came improved by a whopping 43 percent, and even outperformed the control test takers who were left alone. This unexpected, counterintuitive finding requires further research, but Dr. Peer thinks there's a simple explanation: participants learned from their experience, and their brains adapted.

Somehow, it seems, they marshaled extra brain power to steel themselves against interruption, or perhaps the potential for interruptions served as a kind of deadline that helped them focus even better.

Clifford Nass, a Stanford sociologist who conducted some of the first tests on multitasking, has said that those who can't resist the lure of doing two things at once are "suckers for irrelevancy." There is some evidence that we're not just suckers for that new text message, or addicted to it; it's actually robbing us of brain power, too. Tweet about this at your own risk.

What the Carnegie Mellon study shows, however, is that it is possible to train yourself for distractions, even if you don't know when they'll hit.

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