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#### **Why the modern world is bad for your brain**

By Daniel J Levitin

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Our brains are busier than ever before. We're assaulted with facts, pseudo facts, jibber-jabber, and rumour, all posing as information. Trying to figure out what you need to know and what you can ignore is exhausting. At the same time, we are all doing more. Thirty years ago, travel agents made our airline and rail reservations, salespeople helped us find what we were looking for in shops, and professional typists or secretaries helped busy people with their correspondence. Now we do most of those things ourselves. We are doing the jobs of 10 different people while still trying to keep up with our lives, our children and parents, our friends, our careers, our hobbies, and our favourite TV shows.

Our smartphones have become Swiss army knife-like appliances that include a dictionary, calculator, web browser, email, Game Boy, appointment calendar, voice recorder, guitar tuner, weather forecaster, GPS, texter, tweeter, Facebook updater, and flashlight. And we use them all the time. We text while we're walking across the street, catch up on email while standing in a queue – and while having lunch with friends, we surreptitiously check to see what our other friends are doing. At the kitchen counter, cosy and secure in our domicile, we write our shopping lists on smartphones while we are listening to that wonderfully informative podcast on urban beekeeping.

But there's a fly in the ointment. Although we think we're doing several things at once, multitasking, this is a powerful and diabolical illusion. Earl Miller, a neuroscientist at MIT and one of the world experts on divided attention, says that our brains are “not wired to multitask well... When people think they're multitasking, they're actually just switching from one task to another very rapidly. And every time they do, there's a cognitive cost in doing so.” So we're not actually keeping a lot of balls in the air like an expert juggler; we're more like a bad amateur plate spinner, frantically switching from one task to another, ignoring the one that is not right in front of us but worried it will come crashing down any minute. Even though we think we're getting a lot done, ironically, multitasking makes us demonstrably less efficient.

Multitasking has been found to increase the production of the stress hormone cortisol as well as the fight-or-flight hormone adrenaline, which can overstimulate your brain and cause

mental fog or scrambled thinking. Multitasking creates a dopamine-addiction feedback loop, effectively rewarding the brain for losing focus and for constantly searching for external stimulation.

In the old days, if the phone rang and we were busy, we either didn't answer or we turned the ringer off. When all phones were wired to a wall, there was no expectation of being able to reach us at all times – one might have gone out for a walk or been between places – and so if someone couldn't reach you (or you didn't feel like being reached), it was considered normal. Now more people have mobile phones than have toilets. This has created an implicit expectation that you should be able to reach someone when it is convenient for you, regardless of whether it is convenient for them.

Just having the opportunity to multitask is detrimental to cognitive performance. Glenn Wilson, former visiting professor of psychology at Gresham College, London, calls it info-mania. Russ Poldrack, a neuroscientist at Stanford, found that learning information while multitasking causes the new information to go to the wrong part of the brain. If students study and watch TV at the same time, for example, the information from their schoolwork goes into the striatum, a region specialised for storing new procedures and skills, not facts and ideas. Without the distraction of TV, the information goes into the hippocampus, where it is organised and categorised in a variety of ways, making it easier to retrieve. MIT's Earl Miller adds, "People can't do [multitasking] very well, and when they say they can, they're deluding themselves." And it turns out the brain is very good at this deluding business.

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