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Opinions

Ditch the GPS. It's ruining your brain.

By M.R. O'Connor
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It has become the most natural thing to do: get in the car, type a destination into a smartphone, and let an algorithm using GPS data show the way. Personal GPS-equipped devices entered the mass market in only the past 15 or so years, but hundreds of millions of people now rarely travel without them. These gadgets are extremely powerful, allowing people to know their location at all times, to explore unknown places and to avoid getting lost.

But they also affect perception and judgment. When people are told which way to turn, it relieves them of the need to create their own routes and remember them. They pay less attention to their surroundings. And neuroscientists can now see that brain behavior changes when people rely on turn-by-turn directions.

In a study published in Nature Communications in 2017, researchers asked subjects to navigate a virtual simulation of London's Soho neighborhood and monitored their brain activity, specifically the hippocampus, which is integral to spatial navigation. Those who were guided by directions showed less activity in this part of the brain than participants who navigated without the device. "The hippocampus makes an internal map of the environment and this map becomes active only when you are engaged in navigating and not using GPS," Amir-Homayoun Javadi, one of the study's authors, told me.

The hippocampus is crucial to many aspects of daily life. It allows us to orient in space and know where we are by creating cognitive maps. It also allows us to recall events from the past, what is known as episodic memory. And, remarkably, it is the part of the brain that neuroscientists believe gives us the ability to imagine ourselves in the future.

Studies have long shown the hippocampus is highly susceptible to experience. (London's taxi drivers famously have greater gray-matter volume in the hippocampus as a consequence of memorizing the city's labyrinthine streets.) Meanwhile, atrophy in that part of the brain is linked to devastating conditions, including post-traumatic stress disorder and Alzheimer's disease. Stress and depression have been shown to dampen neurogenesis — the growth of new neurons — in the hippocampal circuit.

What isn't known is the effect of GPS use on hippocampal function when employed daily over long periods of time. Javadi said the conclusions he draws from recent studies is that "when people use tools such as GPS, they

tend to engage less with navigation. Therefore, brain area responsible for navigation is less used, and consequently their brain areas involved in navigation tend to shrink."

How people navigate naturally changes with age. Navigation aptitude appears to peak around age 19, and after that, most people slowly stop using spatial memory strategies to find their way, relying on habit instead. But neuroscientist Véronique Bohbot has found that using spatial-memory strategies for navigation correlates with increased gray matter in the hippocampus at any age. She thinks that interventions focused on improving spatial memory by exercising the hippocampus — paying attention to the spatial relationships of places in our environment — might help offset age-related cognitive impairments or even neurodegenerative diseases.

"If we are paying attention to our environment, we are stimulating our hippocampus, and a bigger hippocampus seems to be protective against Alzheimer's disease," Bohbot told me in an email. "When we get lost, it activates the hippocampus, it gets us completely out of the habit mode. Getting lost is good!" Done safely, getting lost could be a good thing.

Saturated with devices, children today might grow up to see navigation from memory or a paper map as anachronistic as rote memorization or typewriting. But for them especially, independent navigation and the freedom to explore are vital to acquiring spatial knowledge that may improve hippocampal function. Turning off the GPS and teaching them navigational skills could have enormous cognitive benefits later in life.

There are other compelling reasons outside of neuroscience to consider forgoing the GPS.

Over the past four years, I've spoken with master navigators from different cultures who showed me that practicing navigation is a powerful form of engagement with the environment that can inspire a greater sense of stewardship. Finding our way on our own — using perception, empirical observation and problem-solving skills — forces us to attune ourselves to the world. And by turning our attention to the physical landscape that sustains and connects us, we can nourish "topophilia," a sense of attachment and love for place. You'll never get that from waiting for a satellite to tell you how to find a shortcut.

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