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# Outdoors and Out of Reach, Studying the Brain

By [MATT RICHTEL](#)

GLEN CANYON NATIONAL RECREATION AREA, Utah — Todd Braver emerges from a tent nestled against the canyon wall. He has a slight tan, except for a slim pale band around his wrist.

For the first time in three days in the wilderness, Mr. Braver is not wearing his watch. “I forgot,” he says.

It is a small thing, the kind of change many vacationers notice in themselves as they unwind and lose track of time. But for Mr. Braver and his companions, these moments lead to a question: What is happening to our brains?

Mr. Braver, a [psychology](#) professor at [Washington University](#) in St. Louis, was one of five neuroscientists on an unusual journey. They spent a week in late May in this remote area of southern Utah, rafting the San Juan River, camping on the soft banks and hiking the tributary canyons.

It was a primitive trip with a sophisticated goal: to understand how heavy use of digital devices and other technology changes how we think and behave, and how a retreat into nature might reverse those effects.

Cellphones do not work here, e-mail is inaccessible and laptops have been left behind. It is a trip into the heart of silence — increasingly rare now that people can get online even in far-flung vacation spots.

As they head down the tight curves the San Juan has carved from ancient sandstone, the travelers will, not surprisingly, unwind, sleep better and lose the nagging feeling to check for a phone in the pocket. But the significance of such changes is a matter of debate for them.

Some of the scientists say a vacation like this hardly warrants much scrutiny. But the trip's organizer, David Strayer, a psychology professor at the [University of Utah](#), says that studying what happens when we step away from our devices and rest our brains — in particular, how attention, [memory](#) and learning are affected — is important science.

“Attention is the holy grail,” Mr. Strayer says.

“Everything that you're conscious of, everything you let in, everything you remember and you forget, depends on it.”

Echoing other researchers, Mr. Strayer says that understanding how attention works could help in the treatment of a host of maladies, like [attention deficit disorder](#), [schizophrenia](#) and depression. And he says that on a day-to-day basis, too much digital stimulation can “take people who would be functioning O.K. and put them in a range where they're not psychologically healthy.”

The quest to understand the impact on the brain of heavy technology use — at a time when such use is exploding — is still in its early stages. To Mr. Strayer, it is no less significant than when scientists investigated the effects of consuming too much meat or alcohol.

But stepping away is easier for some than others. The trip begins with a strong defense of digital connectedness, a debate that revolves around one particularly important e-mail.

## **On the Road**

The five scientists on the trip can be loosely divided into two groups: the believers and the skeptics.

The believers are Mr. Strayer and Paul Atchley, 40, a professor at the [University of Kansas](#) who studies teenagers' compulsive use of cellphones. They argue that heavy technology use can inhibit deep thought and cause [anxiety](#), and that getting out into nature can help. They take pains in their own lives to regularly log off.

The skeptics use their digital gadgets without reservation. They are not convinced that anything lasting will come of the trip — personally or scientifically.

This group includes the fast-talking Mr. Braver, 41, a brain imaging expert; Steven Yantis, 54, the tall and contemplative chairman of the psychological and brain sciences department at Johns Hopkins, who studies how people switch between tasks; and Art Kramer, 57, a white-bearded professor at the [University of Illinois](#) who has gained attention for his studies of the neurological benefits of exercise.

Also on the trip are a reporter and a photographer, and Richard Boyer, a quiet outdoorsman and accomplished landscape painter, who helps Mr. Strayer lead the journey.

Among the bright academic lights in the group, Mr. Kramer is the most prominent. At the time of the trip he was about to take over a \$300,000-a-year position as director of the Beckman Institute, a leading research center at the University of Illinois with around 1,000 scientists and staff workers and tens of millions of dollars in grant financing.

He is also intense personally — someone who has been challenging himself since early in life; he says he left home when he was a teenager, became an amateur boxer and, later, flew airplanes, rock-climbed and smashed his knee in a “high-speed skiing accident.”

They are driving six hours from Salt Lake City to the river, and they stop at a camping store for last-minute supplies. Mr. Kramer waits out front, checking e-mail on his BlackBerry Curve. This sets off a debate between the believers and skeptics.

Back in the car, Mr. Kramer says he checked his phone because he was waiting for important news:

whether his lab has received a \$25 million grant from the military to apply neuroscience to the study of ergonomics. He has instructed his staff to send a text message to an emergency satellite phone the group will carry with them.

Mr. Atchley says he doesn't understand why Mr. Kramer would bother. "The grant will still be there when you get back," he says.

"Of course you'd want to know about a \$25 million grant," Mr. Kramer responds. Pressed by Mr. Atchley on the significance of knowing immediately, he adds: "They would expect me to get right back to them."

It is a debate that has become increasingly common as technology has redefined the notion of what is "urgent." How soon do people need to get information and respond to it? The believers in the group say the drumbeat of incoming data has created a false sense of urgency that can affect people's ability to focus.

In his case, Mr. Kramer says there have been few side effects: the only time he could recall being overly distracted by technology was when he became too immersed in writing a paper, and was late to pick up his teenage daughter.

"As academics, we live on computers," he says.

The scenery has turned spartan as they drop down into a red-rock desert. The group stops for gas in Green River, where Mr. Kramer checks his e-mail again. Mr. Strayer quips that he shows signs of addiction.

"Some people think only others have the problem," Mr. Strayer says. But he concedes of Mr. Kramer, whom he likes and under whom he earned his doctorate: "He's under a lot of pressure."

## **On the River**

They awaken at the Recapture Lodge, a rustic two-story motel surrounded by cottonwood trees. There

are no phones in the rooms, but there is wireless Internet access, installed a few years ago because, the proprietor says, people could not stand to be without it.

Mr. Kramer still has not received any news on the grant. He stuffs his laptop into a backpack and stores it at the motel office.

Hours later, the group arrives at the raft launching site, Mexican Hat, named for a sombrero-shaped rock outcropping. The travelers assemble and pack the rafts, loading food for five days, beer, water jugs, a portable toilet, tents and sleeping bags, kitchen and first aid supplies. Then they're off.

A short distance downstream they see it: a narrow steel bridge 150 feet above the river — after which there is no longer any cellphone coverage.

“It's the end of civilization,” Mr. Atchley jokes.

Late in the afternoon, they make camp on the banks. They eat pork chops, the Big Dipper brilliant above, the thousand-foot canyon walls narrowing their view of the heavens. A few bats dart and dive, seeking bugs drawn to the flashlights.

The men drink Tecate beer and talk about the brain. They are thinking about a seminal study from the [University of Michigan](#) that showed people can better learn after walking in the woods than after walking a busy street.

The study indicates that learning centers in the brain become taxed when asked to process information, even during the relatively passive experience of taking in an urban setting. By extension, some scientists believe heavy multitasking fatigues the brain, draining it of the ability to focus.

Mr. Strayer, the trip leader, argues that nature can refresh the brain. “Our senses change. They kind of recalibrate — you notice sounds, like these crickets chirping; you hear the river, the sounds, the smells, you become more connected to the physical environment, the earth, rather than the artificial environment.”

“That’s why they call it vacation. It’s restorative,” Mr. Braver says. He wonders if there’s any science behind the nature idea. “Part of being a good scientist is being skeptical.”

Mr. Braver accepts the Michigan research but wants to understand precisely what happens inside the brain. And he wonders: Why don’t brains adapt to the heavy stimulation, turning us into ever-stronger multitaskers?

“Right,” says Mr. Kramer, the skeptic. “Why wouldn’t the circuits be exercised, in a sense, and we’d get stronger?”

## **Ideas Start to Flow**

Scientists have long thought about how new forms of media affect attention — from the printing press to the television. But the modern study of attention emerged in the early 1980s with the spread of machines that allowed researchers to see changes in blood flow and electrical activity in the brain. Newer machines have let them pinpoint the parts of the brain that light up when people switch from one task to another, or when they are paying attention to music or a movie.

This has become such a sizzling field of research that two years ago the [National Institutes of Health](#) established a division to support studies of the parts of the brain involved with focus.

Now, Mr. Yantis says, “we can study the brain and the mind together in a rigorous scientific way, rather than a Freudian sit-back-and-think-about-it way.”

This trip is more about rowing while thinking. Mr. Braver and Mr. Yantis sit in a red kayak in calm waters, passing a goose and her two goslings on the banks. The skeptics are talking about how to study the toll taken by constant interruption from e-mail and other digital bursts.

Behavioral studies have shown that performance suffers when people multitask. These researchers are wondering whether attention and focus can take a hit when people merely anticipate the arrival of

more digital stimulation.

“The expectation of e-mail seems to be taking up our working memory,” Mr. Yantis says.

Working memory is a precious resource in the brain. The scientists hypothesize that a fraction of brain power is tied up in anticipating e-mail and other new information — and that they might be able to prove it using imaging.

“To the extent you have less working memory, you have less space for storing and integrating ideas and therefore less to do the reasoning you need to do,” says Mr. Kramer, floating nearby.

Over the course of the next few days, the rafters find themselves darting in and out of such scientific conversations. Two scientists packing their tents discuss which imaging techniques may best show the effects of digital overload on the brain. The full group tosses around ways to measure the release of brain chemicals into the bloodstream. A pair paddling the big raft talk about how to apply neuroeconomics — measuring how the brain values information — to understand compulsive texting by teenagers.

The conversations blur, with periods of silence and awed looks at surroundings — the circling hawks, the bighorn sheep. There are moments, too, when the men experience intense focus during physical challenges, like rafting the rapids or hiking narrow canyon walls.

This is the rhythm of the trip: As the river flows, so do the ideas.

“There’s a real mental freedom in knowing no one or nothing can interrupt you,” Mr. Braver says. He echoes the others in noting that the trip is in many ways more effective than work retreats set in hotels, often involving hundreds of people who shuffle through quick meetings, wielding BlackBerrys. “It’s why I got into science, to talk about ideas.”

### **‘Third-Day Syndrome’**

“Time is slowing down,” Mr. Kramer says. He has been moving quickly his whole life, since he left

home at 15, and has elevated himself to a position of great influence. It's the second day on the river, and he has finished packing his tent. He's the first of the morning to do so, but he feels no urgency.

He has not read any of the research papers he brought. And the \$25 million e-mail? "I was never worried about it. I haven't thought about it," he says, as if the very idea were silly.

Mr. Kramer says the group has become more reflective, quieter, more focused on the surroundings. "If I looked around like this at work, people would think I was goofing off," he says.

The others are more relaxed too. Mr. Braver decides against coffee, bypassing his usual ritual. The next day, he neglects to put on his watch, though he cautions against reading too much into it. "I sometimes forget to put my watch on at home, but in fairness, I usually have my phone with me and it has a clock on it."

Mr. Strayer, the believer, says the travelers are experiencing a stage of relaxation he calls "third-day syndrome." Its symptoms may be unsurprising. But even the more skeptical of the scientists say something is happening to their brains that reinforces their scientific discussions — something that could be important to helping people cope in a world of constant electronic noise.

"If we can find out that people are walking around fatigued and not realizing their cognitive potential," Mr. Braver says, then pauses and adds: "What can we do to get us back to our full potential?"

What he is getting at is something the scientists won't put a fine point on until the last few minutes of the trip: they have ideas on how to answer this question.

## **Heading Home**

Later that night, back at the Recapture Lodge, Mr. Kramer reclaims his laptop from the front desk. At first, he says he'll wait to log on until he showers and rests. Then he decides to have a quick peek. He has received 216 e-mail messages, but nothing about the military grant.

“The \$25 million saga continues,” he says, and logs off.

The next morning, he and Mr. Braver sit in the back of the car, heading to the airport, the pair of skeptics sharing beef jerky and a perspective. The trip didn’t transform them, but it did get them to change the way they think about their research — and themselves.

Mr. Braver says that when he retrieved his phone the night before, it dawned on him how much he turns to it in tiny moments of boredom: “Sometimes I do use it as an excuse to be antisocial.”

When he gets back to St. Louis, he says, he plans to focus more on understanding what happens to the brain as it rests. He wants to use imaging technology to see whether the effect of nature on the brain can be measured and whether there are other ways to reproduce it, say, through meditation.

Mr. Kramer says he wants to look at whether the benefits to the brain — the clearer thoughts, for example — come from the experience of being in nature, the exertion of hiking and rafting, or a combination.

Mr. Atchley says he can see new ways to understand why teenagers decide to text even in dangerous situations, like driving. Perhaps the addictiveness of digital stimulation leads to poor decision-making.

Mr. Yantis says a late-night conversation beneath stars and circling bats gave him new ways to think about his research into how and why people are distracted by irrelevant streams of information.

Even without knowing exactly how the trip affected their brains, the scientists are prepared to recommend a little downtime as a path to uncluttered thinking. As Mr. Kramer puts it: “How many years did we prescribe aspirin without knowing the exact mechanism?”

As they near the airport, Mr. Kramer also mentions a personal discovery: “I have a colleague who says that I’m being very impolite when I pull out a computer during meetings. I say: ‘I can listen.’ ”

“Maybe I’m not listening so well. Maybe I can work at being more engaged.”



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