The Realities of Our Digital World

A review of *The Distracted Mind: Ancient Brains in a High-Tech World* by Adam Gazzaley and Larry D. Rosen

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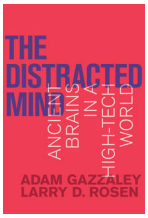

Those familiar with the research on the effects of digital devices in humans (as individuals and as groups) will recognize Adam Gazzaley and Larry D. Rosen, the authors of *The Distracted Mind: Ancient Brains in a High-Tech World.* Both have contributed to the scientific, professional, and popular literature and media in the field. This book makes a significant contribution to that literature, and it is a work that blurs the boundaries within that literature. The argument is grounded in theory and supported by reference to the scientific research, while it both informs educational practitioners and analyzes products and practices marketed to improve brain health.

When they first evolved, our brains (the feature that differentiates us from other animals) were threatened by jaguars hiding in wait (a character Gazzaley and Rosen introduce to illustrate the nature of our natural environment). Those same brains, and their tendency to perceive and attend to certain aspects of the environment now live in an environment not generally inhabited by jaguars but filled with smartphones and information technology networks. In the prologue, Gazzaley and Rosen note, "It is clear that our interruptive technologies are only going to become more effective in drawing our attention away from important aspect of life… (p. xiii). From this pessimistic stance towards our devices, Gazzaley and Rosen proceed.

Distracted Minds Explained

Cognition is a goal-oriented activity; we seek to perceive and make sense of information in the environment to make decisions so we achieve our goals. Both internal and external factors distract us and interrupt us from this activity. Digital devices provide "enticing sounds, compelling visuals, and insistent vibrations that tug at our attention while our brains attempt to juggle multiple streams of competing information" (p. 10). As creatures who depend on information and whose brains evolved to understand and share information, the rich information sources we carry in our pockets are both an opportunity and a challenge.

Despite our knowledge that multitasking interferes with performance (we all know that texting while driving can be very dangerous), we continue to allow our devices to distract us. That behavior can be explained by marginal value theory (MVT), which was originally elucidated by

biologist Eric Charnov in the 1970's. Marginal value theory explains the behavior of animals who forage patchy food sources; it also appears to explain humans' foraging for information on our digital devices.

Marginal value theory posits there is an optimal time that should be spent at a source of food or information. Leaving a source too early results in leaving benefits "ungathered," while leaving too late results in diminished returns. Once a resource has been depleted (the food is gone or the information is gathered), then one benefits from moving on to another source. Successfully navigating the environment requires a forager negotiate sources and make judgements about the value of separate sources and the time needed to move from one to another. Our digital devices change those dynamics as we carry effectively infinite sources of information and the transit time from one to another is nearly instantaneous as we tap and click from app to web to email to social media.

For about 100 pages (a little less than half of the book), the authors explain how digital technologies interfere with:

- our ability to select what is sufficiently important to hold our attention;
- our ability to hold information in our working memory (both the amount of information we can process and the fidelity of our memories);
- our ability to accomplish goals.

Gazzaley and Rosen do suggest "multitasking" is an inaccurate description of what we do when we try to accomplish multiple goals at once. Human brains are incapable of the parallel processing that allows computers to complete multiple tasks at one time. Humans task switch; we focus on one task, then focus all of our cognition on another. Each time we switch our attention from one task to another, there is a delay and a loss of fidelity, which explains our decreased performance.

Effects on Humans

Gazzaley and Rosen suggest "three major technology breakthroughs have been monumental games changers in our current lifetime: the Internet, social media, and smartphones" and they define game changers as "technologies that drive our interference-inducing behavior—both internally and externally—and which ultimately aggravate our Distracted Minds" (p. 105). Our digital devices contribute to continuous partial attention and encourage us to task switch which interfere with our capacity to be productive in the work place and successful in academic situations.

In addition to adversely affecting workplace and academic performance, the authors summarize findings that our Distracted Minds can reduce our safety (distracted drivers again being the archetypical example) and have negative effects on our health (digital devices

interfere with sleep patterns for example). Further, they summarize findings that the negative effects of the Distracted Mind are exacerbated in diverse populations. For example, Gazzaley and Rosen conclude, “Study after study has indicated that too much technology use, whether it be watching television, going on the Internet, using smartphone or tablet, or playing video games, is associated with deleterious effects on the health of children” (p. 147). They do caution, that this correlation does not mean causation, and that it is unclear if health problems motivate greater media use or if media use leads to health problems.

After reviewing research on the effects of technology on older individuals as well as those with clinical conditions such as ADHD, depression and anxiety, and autism spectrum disorders; Gazzaley and Rosen are led to conclude “that the use of modern technology exacerbates the preexisting challenges these individual face in effectively interacting with their environment” (p. 157).

Our digital devices are determining the information landscape in which we live, and humans are information foragers. Marginal value theory explains much that we observe in Distracted Minds. Boredom is a difficult concept to define and study, but it is clear that boredom is a condition that leads individuals to forage for information online. Gazzaley and Rosen conclude, “We see the impact of boredom is not just to make us switch between information patches; we also seem to have lost the ability to simply do nothing and endure boredom” (p. 170). Humans also feel a compulsion to interact with information on their digital devices, and when devices are not available, we feel increased levels of anxiety. Perhaps the greatest threat to our cognition due to these devices is our lack of metacognition; we appear unable to recognize the negative effects of our devices and we are likely to continue using devices even when we are aware of the interference.

Adapting to Digital Distractions

While the book does lead to the rather distressing conclusion that our digital inventions are affecting our cognitive abilities, Gazzaley and Rosen do end the book with a review of some strategies that seem to reduce the negative impact of our Distracted Minds.

- By increasing metacognition, thinking about what we are doing and taking steps to minimize the adverse effects of our digital, we can bring greater focus to our work and recover the efficiency and effectiveness of non-distracted cognition.
- By decreasing accessibility, limiting our access to devices to specific times, we—in effect—increase the time needed to move to new sources of information, thus motivating us to complete tasks before being distracted.
- By reducing boredom and anxiety, we can increase the probability that we complete tasks before distraction. Of the strategies recommended by Gazzaley and Rosen, this reduction seems to be the most difficult to achieve, but they suggest how both technical and non-technical interventions can reduce these factors.

Conclusion

Until I was an undergraduate student in science education, I had little interest in computers. When I discovered they were tools to help me understand and manage information, I became convinced of their role in my life (and my students' lives). After 10 years teaching science and math, I started teaching computer courses for middle school students; in the decades since, I have been an educational technologist who advocates for greater use of digital devices and information in our schools.

In recent years, I have been reading the literature on our inability to multitask which has caused me to think educators need to take a more active role in modeling and recommending appropriate use of digital devices. Coincident with reading this book, I was working with students in a device-rich classroom (the students were given laptops under the school's one-to-one initiative and probably 75% of the student also had a smartphone). The negative effects of these devices of attention and distraction was noticeable, and the better quality of the work done by students who were rarely using their devices for distracting purposes was noticeable.

While I recognize that my observations of the students were informal and in all probability influenced by my reading of this book, my observations seem to support the conclusion that ends the book, "We have been susceptible to distractions and interruptions for our entire lives, but technology's impact on the Distracted Mind has caused us to overindulge" (p. 238).

Despite the rhetoric of integrating technology into our courses and our assumption that students are engaged with their digital devices, educators must follow the lead of this book and be more sophisticated in how we understand digital devices in classrooms. Changing our behavior to minimize the negative effects on our cognition and supporting our students as they do the same is a new lesson we must teach.