Achieving Optimal Memory

What a Harvard Doctor Wants You to Know!

EXPERT INFORMATION ON:

✓ How to tell if forgetfulness is a serious problem or not
✓ Proven, sometimes surprising ways to improve your memory
✓ Drawn from the latest research at top universities

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THE
HARVARD MEDICAL
SCHOOL GUIDE TO
ACHIEVING OPTIMAL
MEMORY

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For Margaret, Julia, and Ava

The true beloveds of this world are in their lover’s eyes lilacs opening, ship lights, school bells, a landscape, remembered conversations, friends, a child’s Sunday, lost voices, one’s favorite suit, autumn and all seasons, memory, yes, it being the earth and water of existence, memory.

—Truman Capote
Acknowledgments

It wasn’t long ago that the idea of treating people with age-related memory loss or devastating memory-robbing disease was considered akin to tilting at windmills. Much has changed over the past twenty years. I have the great fortune to practice at a time when (and in a place where) each day seems to bring us closer to unraveling the secrets of the brain and the mystery of human memory. We are on the brink of disease-modifying therapy and possess the potential to enhance normal cognitive function.

Writing a book is a group project. I am indebted to many people who have contributed to this work. Dr. Martin Samuels, Chairman of Neurology at Brigham and Women’s Hospital, was instrumental in the sequence of events that put me together with Dr. Tony Komaroff, Editor-in-Chief at Harvard Health Publications. I am grateful for their confidence in supporting me in this project. Dr. Samuels also had the vision to create a space for behavioral neurology at the Brigham at a time when starting new clinical care units was a tough sell. Dr. Jonathan Borus, Chairman of Psychiatry at the Brigham, has been the other pillar of our division and an unflagging advocate for the work we do at the hospital and the medical school.

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I feel privileged to work among a fabulous group of talented and thoughtful colleagues at Harvard Medical School and in the Division of Cognitive and Behavioral Neurology at the Brigham. Dr. Kirk Daffner has ably guided our group through the frequently stormy seas of academic medicine, with unstinting commitment to our triune mission of research, teaching, and providing cutting-edge clinical care for our patients. Drs. Mary-Ellen Meadows and Dorene Rentz have been wonderful colleagues since the early days of our Brigham incarnation.

Drs. Kirk Daffner, Wes Farris, Margaret O’Connor, and David Wolk each read various chapters in preparation and provided astute commentary, helping me think through many complex issues. Margaret, in particular, has been my most candid reviewer and has probably forgotten more about memory than I will ever know.

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My work would be meaningless without my patients and their families, who continue to teach me about remarkable courage in the face of adversity and the affirmation of the human spirit. The enthusiasm of my postdoctoral fellows, graduate students, and clinical assistants (Dr. Meghan Searl, Dr. Aaron Hervey, Mimi Boer, Karen Sullivan, Dmitry Meyerson, and Alyson Negreira) reminds me of the importance and excitement of the work we all do.

Most of all I am thankful for my family—Margaret, Julia, and Ava—who make all of the effort and long days worthwhile, and to whom I dedicate this book. They continue to teach me that it takes more than a good memory to have good memories.

—Aaron Nelson
Introduction

You Can Protect and Improve Your Memory

You probably picked this book up because you are concerned that you don’t remember things as well as you used to. You may find it annoying or may even be worried that this is the beginning of a more serious decline. As chief of neuropsychology at Brigham and Women’s Hospital, a teaching hospital of Harvard Medical School, I can tell you you’re not alone. I’ve seen thousands of patients who are worried about their memory. Some of them have neurological diseases, but many more—especially those in their forties and fifties—are in good health and are functioning effectively at work and in their personal lives. Still, something’s wrong.

Research indicates that up to 40 percent of people in this age group are concerned about their memory. It’s often relatively minor bouts of forgetfulness that bring people to my office for an evaluation. “Sometimes I walk into the kitchen and forget why,” one woman told me. “If I stand there for a minute or two, I usually remember. But not always.”

Other patients speak of forgetting where they parked the car at the mall and drawing a blank when they have to enter their PIN number in the cash machine. Some patients tell me that they have to reread passages in books over and over again because they just can’t retain the information as well as they once could. Other patients confess to making errors at work—and fearing the consequences. “I was giving a presentation at our quarterly sales meeting and my vice president asked a basic question about our overseas activity,” said a man in his fifties who works as an account manager for a major electronics company. “The answer should have been at my fingertips, but I couldn’t come up with it; I just froze.”

I’m not going to kid you. I worry about memory lapses just as you probably do. Here’s something that happened to my wife (who heads a neuropsychology service at another Harvard-affiliated medical center) and me. We were about fifty miles from home, driving on a vacation trip, when our six-year-old daughter started looking for her “blankie,” which we’d left behind. Rather than face a week of our daughter’s rage and despair, we went back home to retrieve her prized possession. Thank goodness we did. When we pulled into our driveway, we were shocked to find that we’d left a set of keys in our other car—with the engine running!

As a memory doctor, I know that experiences like the ones I’ve just mentioned usually don’t mean the beginnings of a degenerative brain disorder, such as Alzheimer’s disease. More important, there are plenty of things you can do to strengthen your memory. This book will tell you why you have more trouble remembering things as you age and what you can do about it. It will describe simple things you can do to help prevent memory loss, whether due to aging or illness. The book will also reveal new findings about the brain and discuss new treatments for memory disorders.
Some Memory Loss Is a Normal Part of Aging

Just as your eyes don’t see as clearly as they used to and your hearing isn’t quite as sharp (could have something to do with all those 130-decibel rock concerts you flocked to in your younger days), your brain’s memory operations decline somewhat as you age. Age-related memory loss isn’t a disease but rather the result of normal changes in the structure and function of the brain that occur with age. These changes affect how well you concentrate, how quickly you process information, how effectively you store memories, and how easily you can recall them. These effects become particularly noticeable starting at around age fifty.

If this sounds like bad news, it’s really not. For one thing, memory loss that’s due strictly to the aging process is relatively minor. I don’t mean to make light of the frustration and embarrassment that you and I feel when we forget something that we know we should remember. But age-related memory problems aren’t so severe and frequent that they truly interfere with your ability to function normally in your daily life—that is, to do your job or manage your responsibilities at home. More important, you can guard against many of these problems with simple strategies to improve your ability to concentrate, commit information to memory, and recall it later on. These strategies have worked for my patients and for me, and they can work for you, too.

Optimal Memory Is a Function of Optimal Health

A few years ago, I had a consultation with a fifty-five-year-old executive who had noticed a pronounced decrease in his ability to multitask and retain details related to his work. Testing showed that he was having particular difficulty with attention and concentration—functions that are crucial for effective memory. He had no psychiatric disorder or neurological disease, but he did have a condition that most people don’t think of as having anything to do with memory: obstructive sleep apnea.

Obstructive sleep apnea is a highly common condition in which breathing is disordered during sleep, leading to hundreds of “mini awakenings,” which fragment the sleep cycle. People with obstructive sleep apnea can sleep for eight to ten hours or more and yet wake feeling unrested and unprepared to meet the day. Because people with sleep apnea are less alert, they are less able to process information and therefore to learn and remember. Once we brought my patient’s obstructive sleep apnea under control, his ability to focus his attention and concentrate—and therefore to learn and remember information—improved.

As this vignette illustrates, Alzheimer’s disease isn’t the only cause of memory loss. Many more common—and treatable—conditions can cause forgetfulness, difficulty concentrating, and related problems. Many of these conditions become more common with age, such as hypertension, high cholesterol, thyroid dis- xvi xsease, and, as already discussed, obstructive sleep apnea. Others can occur at almost any age, including depression, alcoholism, insomnia, and drug abuse. Still other contributors to memory problems are bad health habits, such as smoking, poor nutrition, and a sedentary lifestyle. Improving your health habits and getting proper treatment for medical and psychological conditions can help restore and optimize your cognitive function. What’s good for
your general health is good for your memory.

**Brain Fitness**

Scientists are now talking about “brain fitness” the way they’ve long talked about cardiovascular fitness. Let me explain. We’ve known for decades that there are many things that you can do to keep your heart and blood vessels healthy. Controlling blood pressure and cholesterol, not smoking, eating a diet that’s low in saturated fats and trans fatty acids, and exercising regularly are proven ways to reduce your risk of heart disease and stroke. It turns out that essentially every single lifestyle factor that benefits cardiovascular health also benefits brain health. This is no surprise because the brain is highly dependent upon nutrition and energy derived from what we eat and that are delivered through the vascular system. Now researchers are identifying other ways to keep your brain agile and strong so that you can reduce or even reverse the types of memory lapses that are common with age.

While it’s true that the quality of your memory is determined, in part, by your genes (choosing your parents wisely could really help!), preservation of optimal brain condition and function depends on numerous factors, many of which are within your direct control. Optimizing these factors amounts to establishing good habits early in life and sticking with them for the long term. Here are some of the most important things you can do:

- **Prevent or control hypertension and hyperlipidemia.** What’s bad for the heart is definitely bad for the brain. By damaging the tiniest blood vessels, hypertension and high cholesterol diminish the supply of nutrients that the brain depends on to function. What you can do is eat a well-balanced, heart-healthy diet. Dr. Walter Willett’s book *Eat, Drink, and Be Healthy: The Harvard Medical School Guide to Healthy Eating* (2001) is an excellent reference in this regard.

- **Engage in regular cardiovascular, or aerobic, exercise thirty to forty-five minutes per day, at least four days per week.** There is an increasing body of evidence demonstrating the beneficial impact of aerobic activity on brain health and cortical plasticity, the capacity of the brain to sprout new neurons (brain cells) and form newer and denser interconnections among neurons, both of which help your memory.

- **Go easy on alcohol.** Research suggests a beneficial effect of moderate alcohol consumption (one or two beverages per day) on cardiovascular health. But when consumed in excess, alcohol can be toxic to neurons and lead to nutritional deficiencies.

- **Get a good night’s sleep.** For most of us, that means approximately eight hours, although the need for sleep can vary among individuals and across the life span. Some interesting research in the past few years suggests that sufficient good quality sleep is instrumental in helping the brain consolidate new learning—a critical aspect of long-term memory. Good sleep means restorative sleep. If you have trouble with either the quantity or quality of your sleep, consult your doctor.

- **Manage stress.** Living with some degree of stress is a part of the human condition. At moderate levels, stress can actually enhance cognitive function by putting you on alert and
preparing you to focus your full attention on a task. But too much stress overwhelms the brain’s capacity to maintain attention and, over time, actually leads to the degradation of cognitive function. Prolonged stress is also associated with high levels of the hormone cortisol, which can damage regions within the brain that are critical for memory function.

- **Consider taking vitamins.** Judicious use of antioxidant supplements, such as vitamin C, has been associated with decreased levels of free radicals (substances produced in the body and brain that can have neurotoxic effects). Make sure you get enough of the B vitamins; deficiencies can contribute to memory loss.

- **Minimize your use of benzodiazepines and other prescription medications that have known adverse effects on brain function.** Talk with your doctor and work together to find alternative treatment strategies whenever possible.

- **Take care in using over-the-counter medicines, too.** Many of the most widely used over-the-counter medicines can also interfere with mental function because of their effect on brain neurotransmitters, as well as their interactions with prescription medications and even herbal supplements. They include antihistamines, antacids, and sleep medicines. Learn about the side effect profiles of these medications and discuss them with your doctor.

- **Keep learning new things**—new skills, new sports, new hobbies, new areas of personal research interest. The use-it-or-lose-it notion definitely applies to the brain.

- **Minimize passive activities, such as watching TV.** Although TV viewing can be construed as a form of mental activity, research suggests that people who watch relatively greater amounts of TV generally enjoy poorer physical and cognitive health.

- **Maintain a sense of psychological engagement in life.** This is one of the most important and least appreciated factors in optimizing brain health. Find out what it is that makes your life important—whether it’s family, friends, the pursuit of a goal, or possibly even commitment to an idea or a faith. Although the substance of this engagement may evolve across the life span, the sense of maintaining a vital connection to something that matters can be constant.

### New Treatments for Memory Problems

Our knowledge of the underlying process of establishing and recalling memories is evolving rapidly. We’re making tremendous strides in understanding how the brain works. We’re discovering genes that affect how memory changes with age, as well as your risk of developing memory disorders, such as Alzheimer’s disease. We’re also learning how stress hormones and reproductive hormones act on the brain and influence the processes of learning and remembering. These findings help explain why you probably have difficulties thinking when you’re under stress. They also shed light on the memory problems that many women experience during and after menopause and that can plague men whose testosterone levels are low. This book will bring you up to date on the latest research on memory.

What we’re learning about the brain is also leading to the development of treatments that enhance memory. As I write, there are five drugs approved by the Food and Drug Administration (FDA) for the treatment of Alzheimer’s disease: donepezil (Aricept), galantamine (Reminyl), memantine
(Namenda), rivastigmine (Exelon), and tacrine (Cognex). More of these medications are on the way. Research is investigating the use of these drugs in treating a less severe memory disorder called mild cognitive impairment. Now that it’s possible to use medicine to enhance the pathways of memory in the brain, a new door has been opened: it may well be possible to use drugs to make a good memory even better. Indeed, an emerging trend is the use of these drugs (as well as herbal supplements) by healthy people in the hopes of boosting their memories beyond normal limits.

This might sound like a good idea, and maybe, ultimately, memory enhancers will be developed that are a boon to all of us. But there’s a lot that we don’t know, and I’m concerned about potential problems. Like steroids and other substances used by athletes to enhance physical performance, the proliferation of “cognitive enhancers” raises a host of legal and ethical issues, as well as safety concerns, which I discuss in this book. In some instances, an FDA-approved medication might be used for an unintended purpose; in other instances, an unapproved substance is put forward as a panacea. I hope you’ll consider these issues if you’re tempted by any of the drugs and supplements sold on the Internet that promise to endow you with “superhuman” memory.

The focus of this book is the same as my focus as a doctor—to help you make your memory as good as it can possibly be. The strategies and treatments discussed here work. They’re not difficult to use, and they’re not expensive. They make use of what we know about how the brain processes information and makes new memories. No matter how old you are, there are actions you can take to minimize age-related memory loss, prevent the potentially devastating impacts of common diseases, and reverse some of the damage that’s been done. In other words, you can optimize your memory.
What Is Memory?

When we talk about memory, we mean not only all that we remember but also our capacity for remembering. You might think that an optimal memory is a huge database that faithfully records and securely stores all that you have learned and experienced in your life. But actually, that wouldn’t be optimal at all.

Not all memories are created equal. Some are meant to be retained for just a short time and then discarded. Imagine if you carried in your head every phone number you ever dialed or the time and location of every movie you ever saw. These memories would clutter your mind and, like outdated clothing in the closet or junk accumulated in the garage, they would make it harder for you to find the things that you need.

Memories that are important or emotionally powerful are stored in the brain for the long haul. This information is so ingrained that it is a part of you—images, experiences, and knowledge that have become intrinsic aspects of your psychological and social identity. Your memory includes facts and images, like the names of close friends and the faces of loved ones. It also includes procedures and skills, like how to drive a car or swing a golf club, and the specialized knowledge that you use for your work. It’s when we start to forget these important things that most of us begin to worry.

The process of learning new information, storing it, and then retrieving it involves a complex interplay of brain functions. Understanding this process can help you appreciate why some memories endure and others fade away. Different parts of the brain play a role in whether you remember something over the short term or the long term.

Short-Term Memory

Short-term memory is information that you need to remember for just a few seconds or minutes. After that, it vanishes. It’s the date and time of an appointment you just made—and must remember until you write it down in your calendar or personal digital assistant (PDA). Working memory is a form of short-term memory that’s a bit more complex. Working memory comprises information that you hold in mind for a brief time to use for some specific purpose. Think of working memory in terms of your computer—as information that you need to keep up and running in an attentional window.

Working memory comes into play, for example, when you have to consider certain options and then make a decision fairly quickly. Let’s say you’re in the supermarket and you’re trying to decide whether it’s more economical to buy the large size or the medium size of laundry detergent. You remember the price of each and then do a mental calculation of the price per ounce to decide which item to buy. By the time you turn down the next aisle, you’ve probably forgotten the prices because
you no longer need this information.

Short-term memories are supposed to be fleeting. They turn over at a high rate because new ones are continually replacing them, and there is only so much information you can keep in mind at once. Research shows that most people can hold only about five to nine unrelated bits of information in mind. That’s why it’s easier to remember a seven-digit phone number than a much longer number, such as the account number on your [End of Sample]