

# Teacher's Guide

## MOONWALKING WITH EINSTEIN

By Joshua Foer

### Recognition

Named a Best Book of 2011 by *Amazon.com*, *The New York Times*, *The Washington Post*, *O: The Oprah Magazine*, *Discover*, *Salon.com*, *Men's Journal*, *Sunday Times*, and *iTunes*

Reading Level: 9<sup>th</sup> Grade and up

### Quotations from reviews

"[An] inspired and well-written debut book about not just memorization, but about what it means to be educated and the best way to become so, about expertise in general, and about the not-so-hidden 'secrets' of acquiring skills."

- *The Seattle Times*

"[Foer's] passionate and deeply engrossing book. . . is a resounding tribute to the muscularity of the mind. . . . In the end *Moonwalking with Einstein* reminds us that though brain science is a wild frontier and the mechanics of memory little understood, our minds are capable of epic achievements."

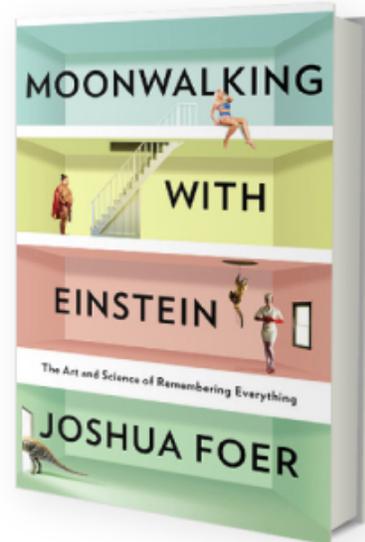
- *Washington Post*

"It's delightful to travel with him on this unlikely journey, and his entertaining treatment of memory as both sport and science is spot on. . . . *Moonwalking with Einstein* proves uplifting: It shows that with motivation, focus and a few clever tricks, our minds can do rather extraordinary things."

- *Wall Street Journal*

"Captivating. . . His narrative is smart and funny and, like the work of Dr. Oliver Sacks, it's informed by a humanism that enables its author to place the mysteries of the brain within a larger philosophical and cultural context."

- *New York Times*



## Summary

In 2005, science journalist Joshua Foer attended the USA Memory Championship as a reporter. When one of the participants claimed that anyone could win the event with the right preparation, Foer became intrigued. Though his initial interest was only in trying out memory enhancement techniques to improve his memory, he soon became obsessed with the process and decided to enter the following year's competition.

*Moonwalking with Einstein* draws on cutting-edge research, a surprising cultural history of memory, and venerable tricks of the mentalist's trade to transform our understanding of human remembering. Under the tutelage of top "mental athletes," he learns ancient techniques once employed by Cicero to memorize his speeches and by medieval scholars to memorize entire books. Using methods that have been largely forgotten, Foer discovers that we can all dramatically improve our memories.

Immersing himself obsessively in a quirky subculture of competitive memorizers, Foer learns to apply techniques that call on imagination as much as determination—showing that memorization can be anything but rote. From the PAO system, which converts numbers into lurid images, to the memory palace, in which memories are stored in the rooms of imaginary structures, Foer's experience shows that the World Memory Championships are less a test of memory than of perseverance and creativity.

Foer takes his inquiry well beyond the arena of mental athletes—across the country and deep into his own mind. In San Diego, he meets an affable old man with one of the most severe cases of amnesia on record, where he learns that memory is at once more elusive and more reliable than we might think. In Salt Lake City, he swaps secrets with a savant who claims to have memorized more than nine thousand books. At a high school in the South Bronx, he finds a history teacher using twenty-five-hundred-year-old memory techniques to give his students an edge in the state Regents exam.

At a time when electronic devices have all but rendered our individual memories obsolete, Foer's bid to resurrect the forgotten art of remembering becomes an urgent quest. *Moonwalking with Einstein* tackles universal questions about the connection between memory and identity for individuals and for our culture. To what extent does what we remember define who we are? How do shared memories create bonds that shape our communal and individual sense of self? *Moonwalking with Einstein* brings Joshua Foer to the apex of the U.S. Memory Championship and readers to a profound appreciation of a gift we all possess but that too often slips our minds.

**About the author**

Joshua Foer was born in Washington, D.C., in 1982 and lives in New Haven, Connecticut. His writing has appeared in *National Geographic*, *Esquire*, *The New York Times*, *The Washington Post*, *Slate*, and other publications. He is the co-founder of the Atlas Obscura, an online guide to the world's wonders and curiosities. He is also the co-founder of Sukkah City, an architectural design competition. *Moonwalking with Einstein*, an international best seller that has been published in 33 languages, is his first book. In 2009, he was named "One of Ten People Who Could Change the World" by *The New Statesman*. For more information, visit his website at [JoshuaFoer.com](http://JoshuaFoer.com), where you'll find links to follow him on Twitter and Facebook.

**About the guide**

As a work of creative nonfiction, *Moonwalking with Einstein* contains multiple narratives with multiple educational applications. It can be used in classes in language arts, social studies, and science. This guide offers questions to help students understand and reflect on the book as they read, along with discussion topics, writing assignments, and research activities that are relevant across the curriculum.

The Guided Reading and Discussion Questions for each chapter help students identify central ideas, draw comparisons, seek support for their opinions, and consider how word choice and writing style create meaning. The Writing Prompts include topics of special interest to language arts, social studies, and science coursework, along with topics of more general interest. They can be used for journal entries, formal papers, research projects, and group discussions and debates. The questions and prompts cover the entire scale of Bloom's Taxonomy (remembering, understanding, applying, analyzing, evaluating, and creating). They ask students to accomplish a range of tasks: from recalling information from the text to explaining a term in their own words to applying a mnemonic device for their own needs to analyzing the effectiveness of multisensory images in memorization to evaluating the author's word choices to creating their own memory palace.

There are also many resources available online, including videos of the author talking about memory and of the USA Memory Championship. Links to these resources appear in the Online Resources section of this guide.

## **Before you read**

Discuss different approaches to writing and how this book bridges some of those approaches. For example, a lot of the information in this book would be appropriate for a textbook (the story of S. might be found in a psychology text, or information about the format of manuscripts before the printing press might be found in a history text, for instance). In contrast, parts of this story are memoir. We also get lots of short profiles of the sort used in biographies or magazine articles. Then there is also the element of the author reporting on something in which he himself is involved (referred to by Foer as immersion journalism). The result is a work of creative nonfiction, in which all of this is woven together in a single story, full of anecdotes and recreated dialogue. Discuss the challenges of creative nonfiction. How does the storytelling help draw readers in? What concerns exist about accuracy? How might students report on one day at school in a completely objective manner? How might they do so as creative nonfiction writers? What kind of immersive journalism might they practice?

## **Guided reading and discussion questions**

### **Prologue**

1. Consider the opening line: "There were no other survivors." What is the tone of this line? Is this tone sustained throughout the entire prologue, or does it change? How would you characterize the tone at the end of the prologue? What does it suggest about the tone and content of the book that will follow? (LANGUAGE ARTS)
2. Consider some of the word choices in this prologue, such as "pawed" in paragraph 1. How does the word "pawed" help communicate the emotions of family members who've lost their loved ones? What about the word "plume" in paragraph 2? Consider the beautiful connotation of this word in contrast to the horror of what is being described and why the author might want to employ such a contrast. (LANGUAGE ARTS)
3. How is the story of Simonides reconstructing his memory conveyed as a kind of magic trick? What is the impression left of the ability to remember something in great detail? (SOCIAL STUDIES)
4. When did Simonides live? (SOCIAL STUDIES)
5. Why do you think the author chose this story for the prologue? (LANGUAGE ARTS)

**Chapter One: The Smartest Man Is Hard to Find**

1. What is your reaction to the bizarre and sometimes disgusting images in the first paragraph? (LANGUAGE ARTS)
2. Have you ever used a mnemonic device to remember something? For example, did you learn the colors of the rainbow by remembering Roy G. Biv (red, orange, yellow, green, blue, indigo, violet)? Can you think of any others? (SOCIAL STUDIES, SCIENCE)
3. How effective are these kinds of mnemonic devices? Is such a device really more effective if it's strange? (SOCIAL STUDIES, SCIENCE)
4. Discuss the author's descriptive style in sentences such as this one: "One is a blow-dried veteran boxing announcer named Kenny Rice, whose gravelly, bedtime voice can't conceal the fact the he seems bewildered by this jamboree of nerds." How effectively does this single sentence create a portrait of the announcer? What do words like "blow-dried," "bedtime," and "jamboree" suggest? (LANGUAGE ARTS)
5. How does a writer's mind work? Trace the series of inspirations that led the author from a machine that popped the world's largest popcorn to Ben Pridmore and the memory championships. Give an example of how your mind has hopscotched like this, perhaps as you did a Google search, with one thing leading to another. (LANGUAGE ARTS, SOCIAL STUDIES)
6. What kinds of things does the author regularly forget? To what extent is this kind of forgetfulness normal? How does it compare to your own forgetfulness? How does his admitting his forgetfulness make us identify with the author? How does it make his attempt to win the memory championship that much more remarkable? (LANGUAGE ARTS)
7. How do the author and Ben Pridmore differ in their individual abilities and in their memorization strategies? (SOCIAL STUDIES, SCIENCE)
8. How does the author imagine a better memory would make him a better person? How would having a better memory change your life? (SOCIAL STUDIES)
9. What are the images conjured by the terms "mental athlete" and "the Super Bowl of savants." Compare this image to the descriptions of the actual competitors. (LANGUAGE ARTS, SOCIAL STUDIES)

10. What are the five events at the USA Memory Championship? Which task sounds the most difficult? (SOCIAL STUDIES)
11. Discuss the terms "savant" and "photographic memory." Why does Ed Cooke insist that these terms don't apply to him? (LANGUAGE ARTS, SOCIAL STUDIES)
12. What is the "memory palace" technique, and for what purposes did people use it in the Middle Ages? (SOCIAL STUDIES)
13. How did the invention of the printing press in the 15<sup>th</sup> century affect the need for memorization? (LANGUAGE ARTS, SOCIAL STUDIES)
14. What does Tony Buzan mean when he says, "The reason for the monitored decline in human memory performance is because we actually do anti-Olympic training"? (SOCIAL STUDIES)
15. How do Ed Cooke and Tony Buzan differ in their attitudes toward competitive memorization? (SOCIAL STUDIES)
16. According to Ed Cooke, what are the two ways of understanding the way the human brain works? (SCIENCE)
17. How have we as a culture "supplanted our own natural memory with a vast superstructure of external memory aids"? (SOCIAL STUDIES)
18. Think about this book as an application of the Scientific Method, which involves asking a question, constructing a hypothesis, testing the hypothesis, and then drawing a conclusion. What is the question the author is seeking to answer? (SCIENCE)

## **Chapter Two: The Man Who Remembered Too Much**

1. Explain the "curve of forgetting." (SCIENCE)
2. What is unusual about the memory of S.? (SOCIAL STUDIES, SCIENCE)
3. Explain the two-alternative picture recognition exam. What does it suggest about the memories of average people? (SOCIAL STUDIES, SCIENCE)
4. How has scientific thinking changed about whether everything we've learned is stored in the brain and can be accessed with the right cues? Do you agree with the current thinking? (SCIENCE)

5. What is synesthesia? (SCIENCE)
6. Explain the nonlinear associative nature of our brains. What is necessary for us to retrieve a memory? (SCIENCE)
7. How was S.'s memory organized? (SCIENCE)
8. Why was S.'s amazing memory more of a hindrance than a help? (SOCIAL STUDIES)
9. How did a study of London cab drivers change traditional beliefs about the brain? (SCIENCE)
10. According to the research study by Eleanor Maguire, what technique were mental athletes using to remember things? (SCIENCE)
11. What is an aesthete? (LANGUAGE ARTS)
12. What is a bon vivant? (LANGUAGE ARTS)
13. How does Ed Cooke remember a person's name? How could you use his technique to remember your teacher's first and last name? (SOCIAL STUDIES)
14. In your own words, explain the "Baker/baker paradox." (SOCIAL STUDIES, SCIENCES)

### **Chapter Three: The Expert Expert**

1. Why is it important to be able to identify the sex of a chicken at a young age? (SOCIAL STUDIES, SCIENCE)
2. What makes chicken sexing so challenging? (SOCIAL STUDIES, SCIENCE)
3. Do you believe it's more likely that people with an excellent memory for something gravitate toward that field or that people in a certain field are likely to develop an excellent memory due to experience? (SOCIAL STUDIES)
4. How do experts, such as the experienced SWAT officers, see the world differently? (SOCIAL STUDIES)
5. How many things can most people remember at one time? (SCIENCE)

6. What's the difference between working memory and long-term memory? (SCIENCE)
7. What is a digit span test? (SCIENCE)
8. What is a phonological loop? How is the phonological loop related to the visuospatial sketchpad, also known as the inner eye, which stores and processes information in visual and spatial form? (SCIENCE)
9. What is chunking? Why does it help with memorization? (SCIENCE)
10. Give an example from the book that illustrates the process of chunking to make memorization easier. (SCIENCE)
11. Apply the process of chunking to some information you need to remember for a class, such as dates in history. Did it help? (SOCIAL STUDIES, SCIENCE)
12. How do experts in fields like chicken sexing and chess use chunking to become so good at what they do? (SOCIAL STUDIES, SCIENCE)

#### **Chapter Four: The Most Forgetful Man in the World**

1. In the human brain, what role does the hippocampus play in relation to memories? (SCIENCE)
2. Explain the two types of amnesia that EP has. (SCIENCE)
3. How important is memory to one's ability to form and sustain interpersonal relationships? (SOCIAL STUDIES)
4. What is priming? (SCIENCE)
5. Explain the difference between declarative and nondeclarative memories. (SOCIAL STUDIES, SCIENCE)
6. Explain the difference between semantic memories and episodic memories. Give examples of when you acquired specific semantic memories and when you acquired specific episodic memories. (SOCIAL STUDIES, SCIENCE)
7. What is Ribot's Law? (SOCIAL STUDIES, SCIENCE)
8. What does it mean to remember something in first person? What does it mean to remember something in third person? Does your own experience

support Sigmund Freud's contention that older memories tend to be remembered in third person while newer memories are remembered in first person? (SOCIAL STUDIES, SCIENCE)

9. What is the earliest memory you can recall? (SOCIAL STUDIES)

### **Chapter Five: The Memory Palace**

1. What is elaborative encoding? (SCIENCE)

2. According to Foer, what kinds of information are our brains good at remembering? What kinds of information are our brains not good at remembering? Does your experience support this distinction? (SOCIAL STUDIES, SCIENCE)

3. According to the Ad Herennium, what's the difference between natural and artificial memory? (SCIENCE)

4. What is a memory palace? (SOCIAL STUDIES, SCIENCE)

5. Give two examples of the memory palaces used by mental athletes. (LANGUAGE ARTS, SOCIAL STUDIES)

6. What does it mean to remember an image—such as the pickled garlic—multisensorily? How does this help with memorizing? (SOCIAL STUDIES, SCIENCE)

7. Do you agree that it's easier to remember something bizarre than something ordinary? How does this reinforce the idea that memorizing is more about creativity than memory? (LANGUAGE ARTS, SOCIAL STUDIES, SCIENCE)

8. What does it mean to anthropomorphize an image? How does this help with memorizing? (LANGUAGE ARTS, SOCIAL STUDIES, SCIENCE)

9. How is the author's use of the memory palace technique a way of testing his hypothesis about the best ways to improve his memory? (SCIENCE)

10. Create a list of 15 things to remember (such as a list of ingredients for a complicated recipe). Then, using your home, construct a memory palace to remember the items on that list. Use multiple senses and strange images to make remembering easier. Does this technique work? (SOCIAL STUDIES, SCIENCE)

**Chapter Six: How to Memorize a Poem**

1. Identify 10 potential memory palaces you could create. Remember that they don't have to be buildings. (SOCIAL STUDIES)
2. As the author describes living with his parents, how does that affect your perception of him? Is he a reliable narrator? Does this information about his living arrangements help humanize him? (LANGUAGE ARTS)
3. Do you agree that the memorization is the best way to truly learn a text? (LANGUAGE ARTS, SOCIAL STUDIES)
4. Give two examples of professional memorizers. (LANGUAGE ARTS, SOCIAL STUDIES)
5. From your own experience, give examples of things you've been able to memorize (such as specific nursery rhymes) that support this point: "The brain best remembers things that are repeated, rhythmic, rhyming, structured, and above all easily visualized." (LANGUAGE ARTS)
6. Compare the ways that men and women memorize poems in the World Memory Championship. (LANGUAGE ARTS, SOCIAL STUDIES)

**Chapter Seven: The End of Remembering**

1. What devices do you use to help you remember things such as important dates, directions, phone numbers, and birthdays? (SOCIAL STUDIES)
2. Describe the format of texts in the time of Socrates, and explain why they needed to be read aloud to be understood. (LANGUAGE ARTS)
3. Identify the ways that Moonwalking with Einstein is different from ancient texts. Besides punctuation, what are the features that make this book easier to read and to consult? (LANGUAGE ARTS)
4. How are our brains associational and nonlinear? (SCIENCE)
5. How do you approach a text differently when you read to remember versus when you read for some other purpose (such as to be entertained or informed)? (LANGUAGE ARTS)

6. Why do you think there has there been such great interest in memory improvement techniques, evident by past and present marketing for books, seminars, and other tools and tricks? (SOCIAL STUDIES)
7. What is Gordon Bell's digital "surrogate memory"? (SOCIAL STUDIES)
8. Respond to the author's question, "If we're bound to have computers that never forget, why bother having brains that remember?" (SOCIAL STUDIES)
9. The author ponders the possibility of connecting a "lifelog" like the one kept by Gordon Bell with our internal memories so that we would have the ability to remember everything. What two examples does he give of how science is already developing some mind-computer connectors? (SOCIAL STUDIES, SCIENCE)

### **Chapter Eight: The OK Plateau**

1. What is the "Major System"? (SOCIAL STUDIES, SCIENCE)
2. Use the Major System to create images for these three numbers: 17, 580, and 4296. (SOCIAL STUDIES, SCIENCE)
3. How does the PAO system work? (SOCIAL STUDIES, SCIENCE)
4. Use the PAO system to create one image for each of these numbers: 28, 47, 92. Then combine them in the way the author describes to come up with a new image for this number: 284,792. (SOCIAL STUDIES, SCIENCE)
5. What are the three stages someone goes through when acquiring a new skill? (SOCIAL STUDIES, SCIENCE)
6. What is the OK Plateau? (SOCIAL STUDIES, SCIENCE)
7. What three strategies do experts use to overcome the OK Plateau? (SOCIAL STUDIES, SCIENCE)
8. Describe what the best chess players do to move beyond the OK Plateau in order to improve. Describe what a person could do to improve his or her typing speed. (SOCIAL STUDIES, SCIENCE)
9. What does the author do to improve his ability to memorize cards? (SOCIAL STUDIES, SCIENCE)

10. Why do the skills of surgeons get better over time while the skills of mammographers do not? (SOCIAL STUDIES, SCIENCE)
11. What two items do mental athletes wear to eliminate distractions? (SOCIAL STUDIES)
12. How does Ed Cooke try to make his birthday party memorable? (SOCIAL STUDIES)

### **Chapter Nine: The Talented Tenth**

1. Who are the "Talented Tenth"? (LANGUAGE ARTS, SOCIAL STUDIES)
2. What have you had to memorize in school? Should more memorization be required in school? (LANGUAGE ARTS, SOCIAL STUDIES)
3. In your opinion, is the ability to memorize a sign of intelligence? (SOCIAL STUDIES)
4. Raemon Matthews says, "You can't learn without memorizing, and if done right, you can't memorize without learning." Do you agree? (SOCIAL STUDIES)
5. What caused Tony Buzan to question the way schools measure intelligence? (SOCIAL STUDIES)
6. What is the significance of the author's mentioning that Tony Buzan mispronounces the word "mnemonics"? (LANGUAGE ARTS, SOCIAL STUDIES)
7. How was learning some memory techniques a revelation for the students Tony Buzan was teaching during his time as a substitute? (LANGUAGE ARTS, SOCIAL STUDIES)
8. What is a mind map? How is it like a memory palace? Have you ever used mind mapping to take notes or make an outline? Is it more effective than traditional note taking? (LANGUAGE ARTS, SOCIAL STUDIES)
9. According to Tony Buzan, how is creativity a kind of future memory? How could improving your own memory make you more creative? (LANGUAGE ARTS, SOCIAL STUDIES)
10. How does it take knowledge to gain knowledge? (SOCIAL STUDIES)

11. Explain this statement: "Memory is how we transmit virtues and values, and partake of a shared culture." (SOCIAL STUDIES)

### **Chapter Ten: The Little Rain Main in All of Us**

1. Is it reassuring to know that no one is born with a great memory and that memory can be improved? Do you think that, with the right training, you could win the USA Memory Championship? (SOCIAL STUDIES)

2. What is savant syndrome? (SOCIAL STUDIES, SCIENCE)

3. What are three kinds of savants, according to Dr. Darold Treffert? (SOCIAL STUDIES, SCIENCE)

4. Describe Daniel Tammet. How is he unusual among savants? (SOCIAL STUDIES, SCIENCE)

5. Why does it matter whether Daniel Tammet is a savant or a mental athlete (that is, whether his memory skills are innate or the result of training)? And why does a savant attract more attention than a trained mnemonist? (SOCIAL STUDIES)

6. Describe Kim Peek. How is he different from Daniel Tammet? (SOCIAL STUDIES, SCIENCE)

7. What evidence suggests that savant-like abilities exist in all of us? (SOCIAL STUDIES, SCIENCE)

8. What is transcranial magnetic stimulation (TMS)? (SCIENCE)

9. Identify some of the inconsistencies that cause the author to question whether Daniel Tammet really is a savant. (SOCIAL STUDIES, SCIENCE)

### **Chapter Eleven: The USA Memory Championship**

1. Describe the new USA Memory Championship event called "Three Strikes and You're Out of the Tea Party." What memorization techniques are employed in this event? (SOCIAL STUDIES)

2. How does a mental athlete clean out his or her memory palaces, and why? (SOCIAL STUDIES)

3. In what sense is Foer in bad shape on the morning of the competition? How is his condition an example of an independent variable (something the experimenter changes) in the Scientific Method? What dependent variables (additional changes that occur because of changes made by the experimenter) occur as a result of this independent variable? (LANGUAGE ARTS, SOCIAL STUDIES, SCIENCE)

4. How does the presence of TV cameras and commentators affect the environment of the competition? How is it different from the description of the previous year's competition that opened this book? (SOCIAL STUDIES)

5. How is the winner determined in international memory events? How is the winner determined at the USA Memory Championship? (SOCIAL STUDIES)

6. What memorization techniques are employed in the names and faces event? (SOCIAL STUDIES)

7. What memorization techniques are employed in the speed numbers event? Why is this the author's worst event? (SOCIAL STUDIES)

8. How does the author do in the speed cards event? What system did he use to memorize all 52 playing cards? (SOCIAL STUDIES)

9. Discuss the unexpected rule change that causes the author not to compete in the poem event. Does this rule seem fair? (SOCIAL STUDIES)

10. How has the random words event been changed to make for more compelling TV? How did this change the way that Foer prepared for this event? (SOCIAL STUDIES)

11. How is it dumb luck that Chester and not the author is eliminated in the "Three Strikes and You're Out" event? (SOCIAL STUDIES)

12. What strategies does Foer employ in the "Double Deck'r Bust" event? (SOCIAL STUDIES)

## **Epilogue**

1. What were the author's two goals when he went to the World Memory Championship? (LANGUAGE ARTS, SOCIAL STUDIES)

2. Why did the author do well in the names and faces event at the world championship? How did he finish overall? (SOCIAL STUDIES)

3. What is the KL7? Why does membership in it mean so much to the author? (SOCIAL STUDIES)
4. What are the three tasks that must be accomplished in five minutes to become a member of the KL7? (SOCIAL STUDIES)
5. According to the FSU researchers, to what extent had Foer's memory improved? According to Foer, to what extent had his working memory actually improved? (SCIENCE)
6. What is the most important lesson Foer took away from his year on the memory circuit? (LANGUAGE ARTS, SOCIAL STUDIES)

### **Writing prompts**

#### **LANGUAGE ARTS**

1. A bildungsroman is a novel in which the main character "comes of age." That is, the protagonist develops into adulthood, maturing in terms of mind and character. Though *Moonwalking with Einstein* is nonfiction, in what sense is it a bildungsroman?
2. Think about this book's title. What are the disparate images conjured by the words "moonwalking" and "Einstein," and how does the disconnection help capture the simultaneously breezy and intellectual spirit of the memory championships and of this book itself? What is the relationship between the book's title (*Moonwalking with Einstein*) and the subtitle (*The Art and Science of Remembering Everything*)?
3. After the prologue, the book begins at the end, then goes back one year to the start of the author's interest in the memory championship, and ends where it started, with the author competing. Consider the effectiveness of this structure. We already know where the story is headed, so that takes away some of the suspense. But what do we not know about the memory championship that keeps us in suspense? And what other questions does this structure raise? For example, do you want to know how the author ended up in this unusual competition?
4. Consider another aspect of the book's structure: its blend of personal storytelling and history and science. How does the personal narrative make the

history and science more compelling? How does it aid in understanding the historical and scientific information?

5. Examine the notes that appear at the end of this book. Sometimes there is additional information such as a discussion of "eidetic memory" (#30) and the British savant Stephen Wiltshire (#31). Discuss why this information is not included as part of the regular text and how its appearance in the notes affects our reaction to it.

6. Irony is an outcome opposite of what is expected. How is Joshua Foer's victory at the 2006 USA Memory Championship ironic? What other examples of irony can you find in the book?

7. Try to memorize a poem using the memory for words. Then try to memorize it using the memory for things. Which technique is more effective?

### **SOCIAL STUDIES**

1. "Participatory journalism" is a term often associated with George Plimpton, who wrote about playing football and boxing with professionals. Research Plimpton's exploits in the name of journalism and compare them to Joshua Foer's immersion in the world of memory competitions. Were their goals similar? What difference does it make that one focused on physical competition while the other focused on mental competition?

2. Compare the terms "participatory journalism" and "embedded journalism," which refers to reporters telling stories as they are attached to a particular military unit. How are the goals of these two kinds of journalists similar? How are they different? How do they each challenge the notion of traditional journalism?

3. Examine the role of memorization in education. Trace its evolution from a staple of learning to a symbol of all that's wrong with education. What is behind the change in thinking about learning through memorizing?

4. Examine some of the arguments made in E. D. Hirsch Jr.'s book *Cultural Literacy: What Every American Needs to Know*. What is it important for educated people to know? Who decides what has value? Is there validity in critics of Hirsch who complain that his view of what we need to know is too limited, that he focuses too much on "dead white males"?

5. Reflect on the connections among memory, identity, and culture. In terms of identity, how do your memories make you who you are? If you know someone with an impaired memory, consider how that memory loss changes

who that person is and how others relate to him or her. In terms of culture, think about how the memory of national events connects a country's citizens. For example, how does the way people refer to the September 11 terrorist attacks help define what it means to be an American?

6. Compare memory championships to spelling bees. How are they alike? How are they different? How was the 2006 USA Memory Championship changed to make it more similar to a spelling bee? Why do spelling bees receive more attention than memory championships?

7. It is suggested in this book that the reason the U.S. is not as strong at memorization as European countries is that Americans look to the future while Europeans look to the past. Do you believe that statement is accurate? And does it adequately explain why Americans don't perform as well as Europeans at the World Memory Championship?

## **SCIENCE**

1. How is memory an art? How is memory a science? Is it more one than the other?

2. Analyze the effectiveness of different mnemonic devices you've learned (such as HOMES to remember the names of the Great Lakes or rhymes to remember spelling rules). What makes a mnemonic device stick?

3. Conduct an experiment on the "curve of forgetting." It could be just the same as the one done by Hermann Ebbinghaus in which he tried to memorize a list of three-letter nonsense syllables like GUF, LER, and NOK. Then he tested how much he remembered after 20 minutes, 1 hour, 9 hours, 2 days, 6 days, and 1 month. Conduct a similar test on yourself, graph the results, and compare it Ebbinghaus' graph (on page 23).

4. Conduct the two-alternative picture recognition exam on your classmates. Show them 30 pictures quickly. Wait 30 minutes for the curve of forgetting to work. Then show them 30 pairs of pictures to see if they can remember which picture in each pair that you showed them. Compare the results to those in the book, in which everyone remembered all 30 pictures.

5. Research the different kinds of synesthesia to examine more thoroughly how this disorder might affect memory.

6. Research savant syndrome, with special attention to the extraordinary memories that some savants have and to understand better the connection

between their extraordinary abilities and whatever impairments they might have.

7. Conduct a search online for memory aids and inventions to help memory. Do these products and their hawkers seem legitimate? Conduct another search for electronic devices that make memorization unnecessary. Do these gadgets make our memories worse?

8. Compare the way the human mind accesses memories to the way that a computer accesses the information it stores.

9. Research and describe the differences between explicit and implicit memory. Include a discussion of which brain areas are primary when using explicit and implicit memories.

10. How does HM's ability to perform the mirror reflection task provide insight into the nature of memory? How did the findings associated with the case of HM lead to insight related to the role of different brain systems in relation to different memory types?

11. What does it mean when the author states, "Episodic memories are located in time and space [whereas] semantic memories are located outside of time and space"?

12. What does the author mean when he states, "Monotony collapses time; novelty unfolds it"?

### **Topics for further discussion**

1. Create your own memory palace in your mind. Then draw a representation of it.

2. Examine how memory is used as a plot device in movies such as *The Vow*, *50 First Dates*, *The Bourne Identity*, *Clean Slate*, *Code Name: The Cleaner*, *Eternal Sunshine of the Spotless Mind*, *The Manchurian Candidate*, *Memento*, *Mulholland Drive*, *The Notebook*, *Overboard*, *The Return of Martin Guerre*, *Spellbound*, *Total Recall*, *Rain Man*, and *Waltz with Bashir*. Classify the different approaches to this topic and the different themes that emerge. Analyze why memory is such a compelling plot device.

3. Compare the title character of *Rain Man* to Foer's description of Kim Peek, the inspiration for this character.

4. Consider the practical applications of the memory techniques described in this book. How might they be applied toward greater success in various professional fields, such as selling real estate, leading a battalion, coaching, nursing, and computer programming, just to name a few?
5. Compare Joshua Foer's original article for Slate about the 2005 USA Memory Championship to his account of that competition in chapter one of this book. How has the passage of time and the greater flexibility of length changed the way he reports on the competition?
6. Locate an expert (someone with lots of experience in some field) and a novice (a beginner in the same field). These could be teachers, police officers, doctors, hairdressers, accountants, etc. Present them with a problem to find out what they think about as they approach the problem. For example, ask the veteran and novice teachers how they would deal with an unruly class. Then write an analysis about whether they truly look at things differently in the way that SWAT officers and chicken sexers do in the book.
7. Examine the different rules for national memory championships and the world memory championship. Which competitions seem the most challenging?
8. Create your own PAO system for numbers 0-9 (feel free to use the one that you created when working through the questions and discussion points of Chapter 8). If you did not complete that particular Chapter 8 assignment, then create a column with a list of 10 people (famous or otherwise); assign each one an action that you would associate with them, and then assign each one an object.
9. Put your PAO system to work. Get a deck of playing cards and remove all the face cards from the deck. This will leave you with all suits numbered from aces all the way up to the tens (aces represent the number one). Now shuffle them and try to memorize them first by employing a form of rote memorization. Now do the same but this time employ your newly created PAO system. Compare your results.
10. How is the Scientific Method employed in Moonwalking with Einstein? Give specific examples associated with HM's, the author's, and other memory competitors' memory tasks and the employment of various techniques.

**Other titles of interest**

Oliver Sacks' *The Mind's Eye*

Oliver Sacks' *The Man Who Mistook His Wife for a Hat*

George Plimpton's *Paper Lion*

Malcolm Gladwell's *Blink*

Bobby Fischer's *My 60 Memorable Games*

Tony Buzan and Barry Buzan's *The Mind Map Book: How to Use Radiant Thinking to Maximize Your Brain's Untapped Potential*

Mary J. Carruthers' *The Medieval Craft of Memory: An Anthology of Texts and Pictures*

Mary J. Carruthers' *The Book of Memory: A Study of Memory in Medieval Culture*

Frances Yates' *The Art of Memory*

Jonathan D. Spence's *The Memory Palace of Matteo Ricci*

Marilu Henner's *Total Memory Makeover*

**Online resources**

Author's web site, which includes his appearance on The Colbert Report, a video of him demonstrating how to create a memory palace, and a lecture he gave about "The OK Plateau": <http://joshuafoer.com/>

Author video demonstrating how to create a memory palace:  
<http://joshuafoer.com/world-science-festival/>

Slate audio book club discussion about Moonwalking with Einstein:  
[http://www.slate.com/articles/arts/the\\_audio\\_book\\_club/2011/04/the\\_audio\\_book\\_club\\_on\\_moonwalking\\_with\\_einstein.html](http://www.slate.com/articles/arts/the_audio_book_club/2011/04/the_audio_book_club_on_moonwalking_with_einstein.html)

A list of movies in which memory is a key plot device:  
<http://socrates.berkeley.edu/~kihlstrm/movies.htm>

RadioLab segment "Limits of the Mind" that includes pieces on S. and on the World Memory Championship: <http://www.radiolab.org/2010/apr/05/limits-of-the-mind/>

Inside-Out program featuring Joshua Foer talking about science journalism, immersion journalism, and training for the memory championship: <http://www.youtube.com/watch?v=q23SHysc77w>

Video of the 2006 Memory championships: <http://www.youtube.com/watch?v=bk7WxNY1u7U>

PBS Newshour interview with Joshua Foer: <http://www.youtube.com/watch?v=CJlzFIl03Ng>

Chicago Humanities interview Joshua Foer: <http://www.youtube.com/watch?v=jg3lUpYZ9g8>

Ben Pridmore memorizing a deck of cards: [http://www.youtube.com/watch?v=g\\_KlsQxf\\_UE](http://www.youtube.com/watch?v=g_KlsQxf_UE)

Ben Pridmore interview: <http://www.youtube.com/watch?v=Yp9qF-SjJZk>

A Psychology Today article about memory, with a focus on Foer's book: <http://www.psychologytoday.com/blog/the-child-in-time/201104/moonwalking-simonides>

Sixth and I Historic Synagogue program featuring Joshua Foer: [http://fora.tv/2011/03/14/Joshua\\_Foer\\_Moonwalking\\_with\\_Einstein](http://fora.tv/2011/03/14/Joshua_Foer_Moonwalking_with_Einstein)

60 Minutes story on actress Marilu Henner and others who have superior autobiographical memories: [http://www.cbsnews.com/8301-504803\\_162-20026088-10391709.html](http://www.cbsnews.com/8301-504803_162-20026088-10391709.html)

NPR interview with Joshua Foer: <http://www.npr.org/2011/02/23/134003962/Moonwalking-With-Einstein>

An interview with Joshua Foer that also includes links to videos of a recent memory champion and of Ed Cooke: <http://www.avclub.com/denver/articles/joshua-foer-author-of-moonwalking-with-einstein,70362/>

Joshua Foer's speaks to CBS News about a study linking Google to lower memory retention: <http://www.cbsnews.com/video/watch/?id=7373663n>

New York Times review of Moonwalking with Einstein:

<http://www.nytimes.com/2011/03/08/books/08book.html?ref=bookreviews>

Joshua Foer's article for Slate about the USA Memory Championship:

[http://www.slate.com/articles/news\\_and\\_politics/dispatches/2005/03/forget\\_me\\_not.html](http://www.slate.com/articles/news_and_politics/dispatches/2005/03/forget_me_not.html)

Joshua Foer's 2007 National Geographic article about memory:

<http://ngm.nationalgeographic.com/2007/11/memory/foer-text>

"The Adderall Me," another Slate article by Joshua Foer and another example of participatory journalism:

[http://www.slate.com/articles/health\\_and\\_science/medical\\_examiner/2005/05/the\\_adderall\\_me.html](http://www.slate.com/articles/health_and_science/medical_examiner/2005/05/the_adderall_me.html)

Joshua Foer's article for Esquire about a young man with locked-in syndrome:

<http://www.esquire.com/features/unspeakable-odyssey-motionless-boy-1008>

Links to articles by Joshua Foer that appeared in the New York Times, Outside, National Geographic, and Esquire: <http://byliner.com/joshua-foer/stories>

Joshua Foer's article about miniature writing for Cabinet Magazine:

<http://www.cabinetmagazine.org/issues/25/foer.php>

Links to additional Slate articles by Joshua Foer:

[http://www.slate.com/authors.joshua\\_foer.html](http://www.slate.com/authors.joshua_foer.html)

**Moonwalking with Einstein and Common Core State Standards**

<http://www.corestandards.org/the-standards>

Moonwalking with Einstein will meet the standard for Range of Reading and Level of Text Complexity for most high school grade levels in language arts, social studies, and science curricula.

This teaching guide provides questions and activities that support standards-based instruction and are directly linked to many of the Common Core Standards for language arts, social studies, and science. The primary areas of connection are standards for reading to evaluate ideas, details, craft, and structure in all of these subject areas. A complete list of the Common Core State Standards can be found at <http://www.corestandards.org/the-standards>. A list of primary standards addressed in the guide can be found below:

**Common Core Standards English Language Arts Grades 9-10:**Key Ideas and Details

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
- Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Craft and Structure

- Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).
- Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

**Common Core Standards English Language Arts Grades 11-12:**Key Ideas and Details

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
- Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.
- Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

#### Craft and Structure

- Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
- Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.
- Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

### **College and Career Readiness Anchor Standards for Reading**

#### Key Ideas and Details

- Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

#### Craft and Structure

- Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
- Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
- Assess how point of view or purpose shapes the content and style of a text.

## **Reading Standards for Literature Grades 9-10**

### Key Ideas and Details

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
- Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

### Craft and Structure

- Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).
- Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.
- Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

## **Reading Standards for Literature Grades 11-12**

### Key Ideas and Details

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.
- Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.
- Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

### Craft and Structure

- Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

- Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.
- Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text

## **Reading Standards for Informational Text Grades 9-10**

### Key Ideas and Details

- Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.
- Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

### Craft and Structure

- Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
- Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).
- Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

## **Reading Standards for Informational Text Grades 11-12**

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- Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.
- Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

### Craft and Structure

- Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
- Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.
- Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

## **Literacy in History/Social Studies, Science, and Technical Subjects: College and Career Readiness Anchor Standards for Reading**

### Key Ideas and Details

- Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

### Craft and Structure

- Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
- Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
- Assess how point of view or purpose shapes the content and style of a text.

## **Reading Standards for Literacy in History/Social Studies Grades 9-10**

### Key ideas and details:

- Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.
- Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.
- Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.

Craft and structure:

- Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social studies.
- Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.

**Reading Standards for Literacy in History/Social Studies Grades 11-12**Key ideas and details:

- Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.
- Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.
- Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.

Craft and structure:

- Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
- Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

**Reading Standards for Literacy in Science and Technical Subjects Grades 9-10**Key ideas and details:

- Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Craft and structure:

- Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
- Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

- Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

## **Reading Standards for Literacy in Science and Technical Subjects Grades 11-12**

### Key ideas and details:

- Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

### Craft and structure:

- Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
- Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

## **About this guide's writer**

Evelyn Beck holds a bachelor's degree and a master's degree in English from Florida State University. She teaches English at Piedmont Technical College in Greenwood, S.C. For more information, visit [www.evelynbeck.webs.com](http://www.evelynbeck.webs.com).

Special thanks to Gary Andrews of Lehigh Carbon Community College

## **Cast of characters**

### Mental athletes

Joshua Foer: winner of the 2006 USA Memory Championship

Ben Pridmore: three-time world memory champion

Ed Cooke: an English memory grand master and Joshua Foer's coach; the 11<sup>th</sup> best memorizer in the world

Tony Buzan: founder of the World Memory Championship

Lukas Amsuss: an Austrian memory grand master; the 9<sup>th</sup> best memorizer in the world

Dominic O'Brien: eight-time world memory champion

Scott Hagwood: four-time USA memory champion

Akira Haraguchi: mnemonist who memorized 83,431 digits of the mathematical constant pi.

Dr. Gunther Karsten: winner of every German national memory championship since 1998; also won the World Memory Championship in 2007.

Corinna Draschl: a 15-year-old Austrian competitor in the World Memory Championship

Clemens Meyer: a Bavarian law student and winner of the World Memory Championship

Ram Kolli: the defending USA Memory Champ

Maurice Stoll: holder of USA records in speed numbers and speed cards.

Tony Dottino: founder of the USA Memory Championship

T. Michael Harty: Lutheran minister from Wisconsin competing in the 2006 USA Memory Championship

Paul Mellor: professional memory trainer competing in the 2006 USA Memory Championship

Chester Santos: software engineer competing in the 2006 USA Memory Championship

Erin Hope Luley: winner of the names and faces event and the poetry event in the 2006 USA Memory Championship

Andi Bell: three-time World Memory Champion

### Researchers

A.R. Luria: a Russian neuropsychologist who studied the memory of S.

William Wagenaar: a Dutch psychologist who studied his own ability to remember, concluding that all memories are retrievable with the right cues

Charles Stromeyer III: a Harvard vision scientist whose paper about a subject called Elizabeth suggested that there is such a thing as a photographic memory

Eleanor Maguire: a British neuroscientist whose study of London cab drivers suggested that the brain has the ability to physically alter itself

Elizabeth Valentine and John Wilding: authors of an academic monograph Superior Memory who worked with Eleanor Maguire to study top finishers at the World Memory Championship

K. Anders Ericsson: a psychology professor who helps run the Human Performance Lab at Florida State University, where he studied Josh Foer's attempts to improve his memory

Bill Chase: a psychologist who performed memory experiments on SF with K. Anders Ericsson

George Miller: Harvard psychologist who discovered that we are able to remember only seven things at one time

Tres Roring: a graduate student in the Human Performance Lab at FSU

Katy Nandagopal: a graduate student in the Human Performance Lab at FSU

Adriaan de Groot: Dutch psychologist who studied chess experts, finding that they used chunking to memorize entire boards, showing that we remember things in context rather than isolated facts

Larry Squire: a neuroscientist and memory researcher at the University of California, San Diego, and the San Diego VA Medical Center who's been studying EP for over a decade

Jen Frascino: research coordinator in Larry Squire's lab who regularly administers cognitive tests to EP

Michael Siffre: a French chronobiologist who lived alone in a cave for two months to see how it affected his perception of time

William James: an American psychologist who wrote in *Principles of Psychology* about psychological time, how time seems longer in youth and shorter in old age; also experimented on himself with memorization

William Scoville: the neurosurgeon who operated on Henry Molaison

Brenda Milner: Canadian neuroscientist whose study of Henry Molaison showed that the hippocampus is needed to turn a short-term memory into a long-term memory

Théodule Ribot: French psychologist who noted that in amnesics, distant memories are clearer than more recent memories

Sigmund Freud: an Austrian neurologist considered the father of modern psychoanalysis

Ulric Neisser: psychologist who compared the transcripts of Oval Office recordings to John Dean's Watergate testimony to analyze his memory; he got details wrong but the gist was right

Paul Fitts and Michael Posner: psychologists who described the three stages a person goes through when learning a new skill

Edward Thorndike and Robert S. Woodworth: psychologists who questioned the benefits of memorization in education

V.S. Ramachandran: a leading brain scientist

Simon Baron-Cohen: a leading brain scientist, an expert on synesthesia, who diagnosed Daniel Tammet

Shai Azoulay: a graduate student in Ramachandran's lab

Dr. Darold Treffert: an expert in savant syndrome

Hans Asperger: an Austrian pediatrician who identified an autism-like disorder in which patients had near-normal intelligence and strong linguistic abilities

Bruce Miller: an American neurologist who studies brain disease called frontotemporal dementia

Allan Snyder: an Australian neuroscientist who uses TMS as an experimental tool to temporarily awaken savant-like abilities in subjects

Research subjects

S.: a journalist who remembered everything and who was studied for 30 years by A.R. Luria

Elizabeth: the first subject to provide proof of a photographic memory

SF: a Carnegie Mellon undergraduate studied for two years by Bill Chase and K. Anders Ericsson through the use of a digit span test; SF improved his ability to remember numbers by a factor of 10

EP: a retired lab technician with one of the most severe cases of amnesia ever documented

Clive Wearing: a former BBC music producer with severe amnesia who, unlike EP, is aware of his condition

HM (Henry Molaison): the most studied subject in the history of brain science, he lost his memory after surgery removed his hippocampus in order to control his epileptic seizures

### Prodigies

Leslie Lemke: blind and brain-damaged musician who can play pieces on the piano after hearing them once

Alonzo Clemons: artist with an IQ of 40 who can sculpt animals after glimpsing them

James Henry Pullen: 19<sup>th</sup>-century deaf and nearly mute "Genius of Earlswood Asylum" who built stunning model ships

Daniel Tammet: epileptic with exceptional math and language skills, subject of the documentary Brainman

Kim Peek: the inspiration for the movie Rain Man, he may have the best memory in the world

Orlando Serrell: a boy who gained savant-like skills after being hit in the head with a baseball

### Others

Simonides: a Greek lyric poet who invented a system of mnemonics to help identify the dead after a catastrophe.

Jorges Luis Borges: author of the short story "Funes the Memorious," about a character similar to S.

Funes: a fictional version of S. and the subject of Jorges Luis Borges' story "Funes the Memorious"

Ted Hughes: British poet who penned a new poem annually for the first few years of the World Memory Championship

Cicero: a Roman philosopher who said that the best way to memorize a speech is point by point

John Dean: President Richard Nixon's counsel whose testimony in 1973 before the Senate Watergate Investigating Committee impressed listeners with his detailed recollections of conversations in the Oval Office; he was called "the human tape recorder" by reporters

Jean Jacques Rousseau: Swiss philosopher who suggested that The Iliad and The Odyssey were first memorized, passed down, and then written down. He did not think memorization should be a part of education.

Milman Parry: a classicist who pointed out mnemonic devices in The Iliad and The Odyssey and that it was originally an oral text, evident through the use of repetition and clichés

Metrodorus of Scepsis: a Greek who developed a system (now lost) of shorthand images for words like conjunctions and articles

Thomas Bradwardine: an English mathematician who devised a system for memorizing syllables

William Perkins: a 16<sup>th</sup>-century Englishman who railed against the art of memory as impious due to the lewd images sometimes imagined

Konstantin Stanislavski: a Russian who developed Method acting, which made words more memorable as it helped actors perform more realistically

Peter of Ravenna: a 15<sup>th</sup>-century Italian jurist who wrote a book on memory training

Giulio Camillo: an Italian philosopher who tried to build a literal memory palace

Girdano Bruno: 16<sup>th</sup>-century Dominican friar, author of *On the Shadow of Ideas*, and creator of a device that turned any word into an image for the sake of memorization

Alphonse Loiset: the American seminar leader and author of the 1886 book *Physiological Memory: The Instantaneous Art of Never Forgetting*, later exposed as a fraud

Mark Twain: well-known American author who also patented a memory game

Gordon Bell: a computer scientist at Microsoft who keeps a digital "surrogate memory" that records everything

Raemon Matthews: teacher at Samuel Gompers Vocational High School in the Bronx, NY, who each year brings his students to compete in the USA Memory Championship

John Dewey: American philosopher who encouraged experiential learning over memorization

E. D. Hirsch Jr.: critic who championed the benefits of memorization in education

Ronald Doerfler: author of *Dead Reckoning: Calculating Without Instruments*

Kenny Rice: announcer at the USA Memory Championship

## **Timeline**

1.8 million – 10,000 years ago: Pleistocene Era, when humans' focus on hunting and gathering helped shape the human brain

5th century B.C.: Simonides developed the memory palace as a mnemonic device

13<sup>th</sup> century: the first concordance of the Bible was compiled, allowing one to consult the Bible without having memorized it

15<sup>th</sup> century: invention of the printing press by Gutenberg made memorization less important

16<sup>th</sup> century: Giulio Camillo tried to build a wooden memory palace

1870s: the beginning of studying memory in the lab by Hermann Ebbinghaus

1890: William James wrote in *Principles of Psychology* about psychological time, how time seems longer in youth and shorter in old age; life seems to speed up as it gets less memorable

1927: the discovery of how to identify the sex of chickens was unveiled at the World Poultry Congress in Ottawa

1928: A.R. Luria began to study the memory of S.

1940s: Adriaan de Groot studied chess experts, finding that they used chunking to memorize entire boards, showing that we remember things in context rather than isolated facts

1953: William Scoville operated on HM

1956: George Miller published a paper about how we're able to remember only seven things at one time

1960s: Paul Fitts and Michael Posner described the three stages a person goes through when learning a new skill

1962: Michael Siffre lived alone in a cave for two months to see how it affected his perception of time and his ability to remember

1962: Brenda Milner's study of HM provided evidence that amnesiacs could still learn—though without realizing they were learning

1970: Charles Stromeyer published a paper in Nature about a student's photographic memory

1978-1984: William Wagenaar kept a diary to test his ability to remember anything given the right cues

1979: John Merritt was unable to repeat Charles Stromeyer's experiment about photographic memory

1987: Simon Baron-Cohen developed the Test of Genuineness for Synesthesia

1991: first World Memory Championship, founded by Tony Buzan

1997: first USA Memory Championship, founded by Tony Dottino

1999: the only year that an American finished in the top five of the World Memory Championship

2000: Eleanor Maguire's study of London cab drivers suggested that the brain has the ability to physically alter itself

2005: Joshua Foer attended the USA Memory Championship as a reporter

2006: Joshua Foer won the USA Memory Championship