Advance Praise for *Outsmart Your Brain*

"In a sentence, this is the best book I've read on how anyone can learn the tactics of the most successful students. Practical but backed by the latest science, *Outsmart Your Brain* is an on-ramp to the virtuous cycle of interest, confidence, and achievement."

—Angela Duckworth, *New York Times* bestselling author of *Grit*

"If left to our own devices, humans will usually study poorly. Luckily, Dan Willingham has identified all the ways we can trick our brain into learning (before it tricks us first). A user's guide to the student's brain."

—Amanda Ripley, *New York Times* bestselling author of *The Smartest Kids in the World*

"The ultimate guidebook for doing well in school, and the perfect gift for any student heading off to college, and also for the high school student who is beginning to care about grades, or—better yet—actual learning."

—Jonathan Haidt, *New York Times* bestselling coauthor of *The Coddling of the American Mind*

"Brisk and interesting, this is a wonderful book with a wealth of practical advice for students in 'how to' chapters on many topics. I would also recommend the book for teachers and lifelong learners—anyone who cares about learning."

—Henry L. Roediger III, coauthor of *Make It Stick: The Science of Successful Learning*

"Willingham does double duty: he places the power to learn back where it should be, in the hands of students, while showing teachers how to harness the most effective systems and techniques for boosting learning. An essential tool for the new school year, every bit as important as that calculator, handful of sharpened pencils, and stack of notebooks."

—Jessica Lahey, *New York Times* bestselling author of *The Gift of Failure*

Also by Daniel T. Willingham

Why Don't Students Like School?
The Reading Mind
Raising Kids Who Read
When Can You Trust the Experts?

Outsmart Your Brain

DANIEL T. WILLINGHAM

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INTRODUCTION

When you started preschool, your teachers and parents had no expectation that you would be responsible for your own learning. No parent has ever said to a five-year-old, "Your teacher tells me that you're not really giving your best when it comes to learning your colors. She also says that you don't fingerpaint like you really *mean* it. I don't see why I should keep paying for preschool if you're not going to apply yourself!" It was your teacher's responsibility to create an environment where you would learn.

But by your early teens, school had morphed into a format where you carried much greater responsibility for your own learning. The teacher lectured while you took notes; at home, you read textbooks, completed assignments, and studied for tests. This class format meant your teachers expected that you knew how to (1) set priorities and plan your schedule; (2) read difficult content independently; (3) avoid procrastination; (4) memorize content; (5) avoid distractions; (6) judge when you had studied enough; (7) show what you knew on a test; and (8) deal with emotions like anxiety that interfere with learning. And if you didn't do those things well, it was your problem, not the teacher's. In short, you were expected to be an independent learner.

But your brain doesn't come with a user's manual. Independent learning calls for many separate skills, and you needed someone to teach them to you. Most likely, no one did. Surveys of college students show that the vast majority devise their own strategies for studying, avoiding procrastination, and so on. But the strategies they come up with usually aren't very good. That's why I wrote this book. It's a user's guide to your brain that will allow you to fully exploit its learning potential and so become an independent learner.

How I Came to Write This Book

My primary motivation in going to graduate school was not an altruistic wish to help people learn but a selfish wish to become a professor, because I believed that professors didn't have bosses. (That turned out to be less true than I thought but more true than I probably deserve.) I entered a psychology doctoral program with a let's-see-how-this-goes attitude, which is exceptionally stupid planning.

But I got lucky. I found myself fascinated by the human mind and especially human learning. I finished the program with enthusiasm, and I lucked into a job teaching at a college. My research concerned memory, but it was pretty technical and removed from everyday life. You've heard the joke about the guy who gets a PhD, whereupon his mother explains to her friends, "He's a doctor, but not the type who helps people." I was a learning researcher, but not the type who helps you learn.

So it went for about ten years. One day I got a phone call from a near stranger, inviting me to come to Nashville to deliver a lecture on learning to five hundred teachers. I politely pointed out that I didn't know anything about teaching because I was a doesn't-help-you type of researcher. He said, "Sure, we get that. We just think teachers would find it interesting." Puzzled but flattered, I said, "Okay."

Six months later it was time to write the talk, and I panicked. Obvi-

ously teachers know how children learn; what could I possibly say that they didn't already know? I considered backing out, but I knew it was too late for the event organizers to replace me. I threw together a fifty-minute talk, plucking a few ideas from the introductory course on cognition that I had been teaching to college sophomores. I was so certain the talk would flop that half an hour before it started I asked my wife (a teacher), whom I had dragged to Nashville for my first talk about teaching, *not* to attend.

But to my considerable surprise, it was a success. Teachers didn't know the content, even though it covered material you'd take in your very first course on learning. Furthermore, they saw it not as abstract but as useful in their classrooms.

My career changed course. I thought teachers could benefit from knowing what scientists have figured out about how people think and learn, so I started writing articles and books that explained it.

I also started thinking about how this information applied to my own students. I added a "how to study" lecture to my introductory course on cognition. Students said it was useful, but their grades didn't change much. I had focused on efficient ways to commit information to memory, so I guessed that there must be other aspects of studying that caused problems.

When students came to my office for help, I started asking more questions about their study habits and strategies. I asked them to bring their textbooks and notebooks to our meetings so we could talk about how they read and took notes.

I learned that my students struggled for many reasons, not just poor memorization strategies. Some didn't know how to comprehend a complex book chapter, some procrastinated, some had trouble understanding lectures, some choked when they took a test, and so on.

After about a year I felt I was getting pretty good at diagnosing where the problem lay for any given student. But I wasn't great at getting

students to change how they studied, which, to be honest, I thought was strange. They came to me because they knew things weren't going well. Why not try my advice?

Why Your Brain Must Be Outsmarted

I solved the puzzle by accident. A student asked me how I had become interested in memory, and I was reminiscing about a course I had taken in graduate school. "I was so struck by the *weirdness* of memory," I said. "So much of what I thought was true wasn't." As the words were coming out of my mouth, I realized how strange my advice about studying probably sounded to my students.

For example, *wanting* to learn has no direct impact on learning. You often remember things you didn't try to learn. I expect you could tell me whether or not Prince Harry is married, what Harvey Weinstein did wrong, and whether or not Bradley Cooper played the lead in the movie *Forrest Gump*. You didn't study any of these things; you were simply exposed to them, and they stuck in your mind. When I was a college student, I spent much time frantically trying to cram new knowledge into my head; it was weird to be told that the desire to learn doesn't matter.

I was equally dumbfounded to discover that repetition, although it often helps learning, doesn't guarantee it. For example, do you know what's written across the top of a dollar bill? There's an eagle on the back of the bill; what appears over its head? Given the number of dollar bills you've seen in your life, with all that repetition, you'd think you'd know what one looks like.

So I started asking my students, "Please, be honest: Did you try any of those strategies I recommended?" Most said they had, but not more than once. The problem wasn't that the strategies sounded weird, it was that they felt ineffective while they were doing them.

That made sense to me; learning is like exercise in this way. If you want to increase the number of push-ups you can do, you could practice push-ups, but it would be even better to practice really difficult push-ups, like those where you launch yourself off the floor and clap. You can't do very many of them, so it feels counterproductive. "This is stupid. I'm trying to do a lot of push-ups, and I can only do a few of these!" You have to keep in mind that the greater challenge will make you stronger in the long run. In contrast, if you practice push-ups on your knees, it *feels* like things are going great because you can do so many so quickly, but it's obviously a less effective exercise.

When you're trying to learn, your brain tells you to do the mental equivalent of push-ups on your knees. Your brain encourages you to do things that feel easy and feel like they are leading to success. That was why my students, left to their own devices, drifted toward the same ineffective study strategies. Outsmarting your brain means doing the mental exercise that *feels* harder but is going to bring the most benefit in the long run.

How to Use This Book

Most of schooling—starting around age twelve and continuing through postcollege education, like medical or law school—has the same format: You learn by attending lectures and reading on your own. You demonstrate your learning by taking tests. There's more to schooling than that (sometimes you have to write a paper, for example), but these three tasks—listening, reading, taking tests—make up the bulk of a student's work. So these are the tasks I've addressed in the book.

Naturally, each of these basic tasks has subcomponents. For example, studying for a test requires not only committing things to memory but having good notes to study, planning time in your schedule to study, and so on.

Each chapter of this book guides you to success in one of these processes. You can pick and choose which chapters to read according to which aspects of learning you want to improve. You don't have to read the chapters in order or read all of them. And I don't expect that you will use all of the tips in a chapter. I offer a bunch so you can select one that appeals to you; if it doesn't work, try another. But don't reject a strategy simply because it sounds to you as though it won't work. Remember, many will sound funny, and they may feel, at the time, as though they're not working! Judge the effectiveness of a method by the results, not by how it feels to do it. Instructors will find the advice for students useful, but there's also a section at the end of each chapter that describes how they can make use of the same principles in the classroom.

Your memory is a tool, and this book is an operating manual that will allow you to become an independent learner. I can't promise that I'll make learning completely effort-free. The brain just doesn't work that way, and if anyone tells you otherwise . . . well, keep your hand on your wallet while they're around.

What I can promise is much greater efficiency. I will show you how to change your approach to learning so that you can learn on your own and so that the effort you put in will have much greater impact. You'll learn faster, and what you learn will stick with you longer. All you need to do is understand a bit about how your brain works—and about its stumbling blocks. Then you can outsmart it.

CHAPTER 1

How to Understand a Lecture

By the time students get to college, they've listened to thousands of hours of lectures, so you'd think that they'd all be quite good at learning that way. They usually aren't. Part of their problem is the inability to take good notes, and I'll tackle that topic in the next chapter. Here I want to focus on understanding what the instructor says.

Now, if you don't understand, your next step seems obvious: ask for clarification. But what if you fail to understand and *you don't realize that you haven't understood*? How are you supposed to guard against that?

Let's consider the process of noticing that you don't understand something. That feeling is triggered by a failed search of your memory. For example, a talkative stranger at the grocery store says, "Wow, this stack of cans is in a parlous state, right?" Or a friend asks, "What does it mean when a bird sings at night?" In either case, you search your memory for information (definition of *parlous*, why insomniac birds sing), you don't find it, and so you think, "I don't get it."

There's a second type of failed memory search that leads to confusion, and it's based on how people communicate. When people speak, they don't say a lot of what they actually mean. They are not trying to be

mysterious; they assume that you have the missing information in your memory and will use that information to fill the gaps in what they said. For example, suppose a friend says:

> "What the heck, I called Domino's an hour ago. Have you seen my phone?"

The connection between the first and second sentences seems obvious—the friend is asking about his phone to call the pizza place—but consider how much information is needed to make that connection. Your friend assumed you knew that Domino's is a business that delivers pizza, that you knew an hour is a long time for pizza delivery, that calling the store is an appropriate action for poor service, and that phones are for making calls.

We always omit information when we speak. If we didn't, communication would be really long and really boring. ("Toss me my phone, would you? Because I want to make a phone call, and that's what phones are for.")

Now imagine your friend says this:

> "What the heck, I called Domino's an hour ago. There are at least six minnows in the shallow part of the pool."

It's fine for neighboring sentences not to have an obvious connection—sometimes someone's talking about pizza, and the next moment she's asking about her phone—but we assume we will find a connection once our memory is consulted.

So we recognize that we've failed to understand when we probe our memory for either (1) a fact (the meaning of *parlous*) or (2) a connection (pizza and minnows) and find nothing. These are cases when you know that you don't understand and you can do something about it—most obviously, ask the speaker to explain.

Now, when would you fail to understand and not even know that you're missing something?

It won't happen with an unknown vocabulary word, but it could with a connection, because there can be more than one possible connection. Perhaps you connect two ideas in one way and hence think you've understood. But the speaker thought you would *also* connect them in another way. You've missed something, but you don't realize it.

For example, suppose in a history class the instructor says:

> "A lot of movies starring Shirley Temple came out during the 1930s. They were meant to make their audience feel good and forget their troubles."

A listener might think that he's understood the connection between the sentences: each provides a fact about Shirley Temple movies. But suppose that a few days earlier the instructor had taught about the Great Depression: that economic times were terrible in the 1930s and most people were struggling financially. The lecturer thought listeners would understand that Shirley Temple's movies were popular because they made people feel good during economically difficult times.

So now we see how you might fail to understand something but not perceive that you don't understand: you make a connection between ideas, so you think you've got it, but the instructor wants you to connect them in another way.

This sort of problem is especially likely to pop up during lectures because of the way they are organized. Conversations are unplanned; I just talk about things as they occur to me, so connected ideas typically follow one after the other almost immediately. But lectures are usually organized hierarchically, which means the instructor wants the listener to connect some ideas that are not next to one another. Let's look at what that means.

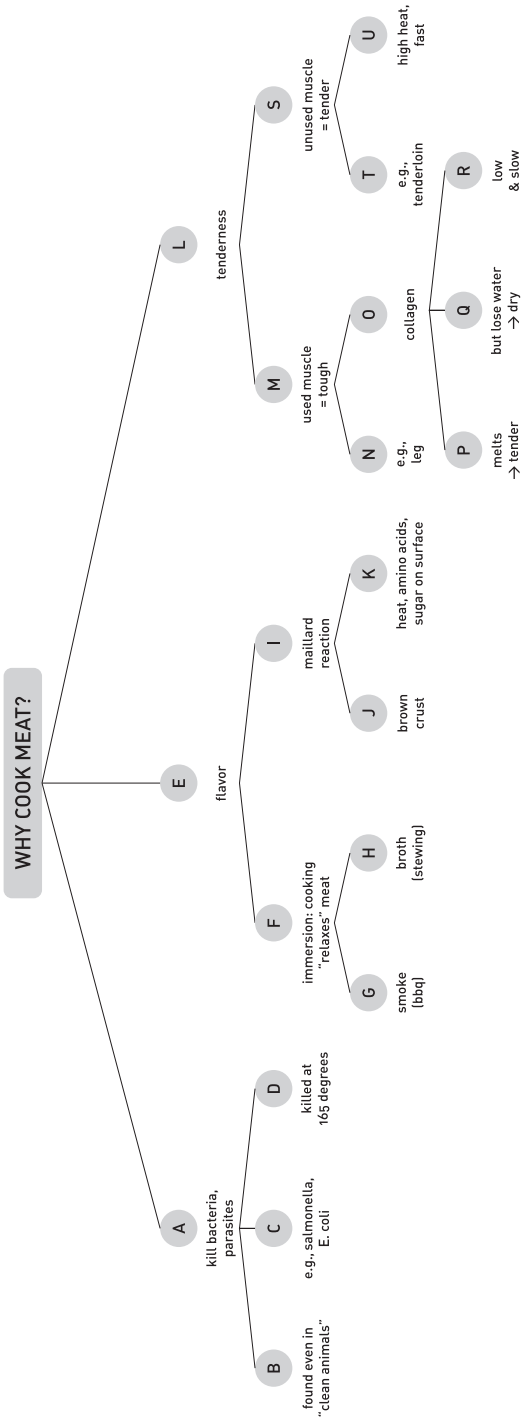
Imagine taking a food science class and attending a lecture on cooking meat. There are three main topics for the day: cooking meat kills bacteria, it imparts flavor, and it makes meat more tender. The figure on the opposite page shows a partial outline of the lecture.

This is the organization the speaker might have in her head, but it's not the organization you would experience in her class. No one talks in a hierarchy. Learners experience lectures linearly. The capital letters show the order in which a speaker would talk about each point.

The ideas labeled A, E, and L ("kills bacteria," "flavor," and "tenderness") ought to be linked. Those all exist in a subcategory: the three reasons that humans cook meat. But if the instructor simply goes through the lecture without highlighting that, some listeners will miss that important connection. The neighboring sentences in the lecture will probably connect well enough, so that there's no sentence that surprises students and makes them wonder, "Wait, what is this idea supposed to connect to?"

Now we see why most students get the factoids in lectures, for example, the definition of terms such as *collagen* and *psoas muscle*. They notice they don't know those words, just as you noticed *parlous*. It's the deeper connections they miss, ideas that are related by how they function or because they are all evidence for or examples of a broad conclusion. The information they miss is also the information instructors think is more important.

In summary, your brain evolved to understand typical speech. In a normal conversation you don't plan fifty minutes of remarks in advance; you say things as they occur to you, and because you're planning only a sentence or two at a time, you're unlikely to say something that can be understood only if your listener connects what you're saying now to what you said twenty minutes ago. But lectures are planned and organized hierarchically. Therefore, it's not just possible that an idea connects to something mentioned twenty minutes ago, it's likely, and if a student misses that connection, she will miss a layer of meaning.


WHY COOK MEAT?
A
kill bacteria, parasites
B
found even in "clean animals"
C
e.g., salmonella, E. coli
D
killed at 165 degrees
E
flavor
F
immersion: cooking "relaxes" meat
G
smoke (bbq)
H
broth (stewing)
I
maillard reaction
J
brown crust
K
heat, amino acids, sugar on surface
L
tenderness
M
used muscle = tough
N
e.g., leg
O
collagen
P
melts → tender
Q
but lose water → dry
R
low & slow
S
unused muscle = tender
T
e.g., tenderloin
U
high heat, fast

WHEN LEARNING BY LISTENING
What your brain will do: It will listen to a lecture the way you listen to a friend speaking and therefore miss deeper connections in the content.
How to outsmart your brain: Plan for the mismatch between the way the speaker thinks of the content being organized (a hierarchy) and the way you experience a lecture (linearly), so that you make the connections the speaker wants you to.

In this chapter you'll learn some tricks to ensure that you get the deeper meaning of a lecture, not just the new vocabulary words and factoids.

TIP 1

Extract the Organization from a Lecture

Ideally a speaker will be explicit about organization; she will tell you at the start of the lecture, "This is what you're going to learn. The main conclusion is X. There will be four points that support X." And then during the lecture, she'll refer back to this organization, saying, "Okay, now we're finished with the first point that supports our conclusion. Let's move on to the second." She's telling you what the organization is as she goes.

But what if she doesn't? In that case, you must do your best to figure

it out yourself. For example, in the lecture we discussed earlier about cooking meat: if the instructor says, "Cooking also makes tough meat more tender," you're supposed to know that this statement is one of the three reasons explaining why humans cook meat.

But as you listen, you're not going to appreciate every bit of the lecture organization. It moves too quickly. **Aim for getting the first two levels of the hierarchy.** The top level is the question, or the overriding theme of the day. In our food science lecture, the top-level question was "Why cook meat?" In a history class, it might be whether presidential candidates today could run front-porch campaigns—candidacies in which the politician does not travel but makes speeches close to home.

You may get help in determining the lecture organization from a written document you see before the lecture—a syllabus if it's a class, a handout if it's a presentation—that gives you some idea of the main topic. If you have no advance knowledge of the theme, a decent guide is *whatever the speaker says first*. Speakers almost always provide a summary, even if it's just a sentence or two, of the topic to come. Which means that if you're a minute late, you'll miss it. If you're slow to turn your attention to the speaker because you're chatting with the person next to you or you're on your phone, you'll miss it. **Be present and ready for the start-of-presentation summary.**

The second level of the hierarchy will be pieces of evidence that support the conclusion of the day. As we saw in the food science lecture, it was the three reasons people cook meat. In the history class, perhaps the second level of the lecture would be examples of successful (and unsuccessful) front-porch campaigns, the nature of media when such campaigns were conducted, the characteristics of the candidates who ran them, and then a summary of these factors as related to modern politics.

If the point of the lecture is to teach you to *do* something—draw blood, for example—the subpoints might be substeps of the procedure,

justifications for why they are effective, or a list of circumstances describing when to use each method.

Again, a good instructor will use verbal cues that explicitly say, "I've finished defining the features of a front-porch campaign, so now I'll give some historical examples." Ineffective instructors won't do that, but *they* know they are shifting topics, even if they don't think to tell you. So **listen for verbal cues that provide clues to organization**, for example:

- "The second reason . . ."
- "That raises a different question."
- "So *now* we know . . ."
- "Let's look at this from a different perspective."
- "Anyway . . ."
- "Okay."

Look for nonverbal cues. Instructors usually stop for questions when they've finished covering a topic, to be sure their listeners understand it before moving on to something new. If the instructor stops to consult her notes, or even if she pauses for a moment to think, that probably signals a shift to a new topic; she's finished with one idea and is checking to see what's next.

You shouldn't try to put together the whole hierarchy while you're listening to a lecture, but do **try to interpret details in light of broader ideas**. Remember, the whole point of this chapter is how to understand new content as you listen. Part of understanding is interpreting things in the right context. For example, take the fact that when James Monroe was elected president in 1820, he received every vote in the electoral college except one. This same fact might be mentioned:

- As evidence that it was an "era of good feeling" and harmony in the United States

- As evidence of the weakness of the Federalist Party after the War of 1812
- In the context of Monroe's hope that the party system would die out

To interpret details in light of the big picture, you have to keep the big picture continually in mind as you're listening. That's hard to do because you're trying to follow the lecture and take notes. So instead, mentally check in with the big picture every now and then. Suppose you've learned about vectors in a previous class and now the instructor introduces the idea of vector addition. It's hard to simultaneously understand this new idea and think about how it connects to other ideas in the course. So try to think about it when the instructor is ready to shift to a new topic. When the instructor asks if there are any questions, don't just ask yourself, "Do I understand what she just said?" Also ask yourself, **"Do I understand how what she just said relates to the broader topic of the day?"** If it's not obvious, ask.

> ***In a sentence:*** Expect that lectures will be hierarchically organized, and try to extract the organization during the lecture.

TIP 2

Expect Listening to Require Work

People often mistakenly think that attending a lecture is easy because they're just listening. In fact, lectures have a bad reputation among some educators because they seem passive; students just sit there. But this is

inaccurate, and in the previous section we saw an important reason that **learning from a lecture requires active thinking:** listeners must rebuild the hierarchical organization of what they hear.

There are other important ways in which lectures differ from typical conversation. People use more unusual vocabulary when they deliver a lecture, and they are communicating more difficult ideas than you normally would when talking to a friend. Further, your friend usually notices whether or not he is understood; he might pause or say, "You know?"—which is your cue to show that you're getting it by nodding or saying, "Right." Instructors pause for questions much less frequently.

Plutarch, the Greek biographer, commented on the difficulty of listening nearly two thousand years ago:

> There are others who think that the speaker has a function to perform, and the hearer none. They think it only right that the speaker shall come with his discourse carefully thought out and prepared, while they, without consideration or thought of their obligations, rush in and take their seats exactly as though they had come to dinner, to have a good time while others toil. And yet even a well-bred guest at dinner has a function to perform, much more a hearer; for he is a participant in the discourse and a fellow-worker with the speaker.

I've taught a large lecture course for each of the last thirty years, and I've been speaking to groups of adults at schools and corporations for the last fifteen. Unengaged students and adults look the same, and they are easy to spot. They slump in their seats. Their eyes are dull, and they focus only slowly when I start to talk. It's not that they are tired or anxious or distracted by personal problems; it's that they are *passive*. They're treating a lecture like a movie or a concert.

It's easy to see why you'd feel like you're part of an audience when

you're in a large lecture hall with a few hundred other students. It's natural to expect that the entertainment will come to you. But you'll fare much better if you come to each lecture psychologically prepared to put in some mental effort.

> ***In a sentence:*** Learning by listening takes work, so come to each class with that expectation.

TIP 3

If You're Given Notes, Use Them to Check Your Notes, Not Replace Them

Suppose the speaker provides you with copies of her notes. Or with an outline of the lecture or copies of the figures. How should you use them? You can get closer to answering that question by answering another: Why do you take notes in the first place?

Researchers have asked people that question, and they point to two functions that you've probably thought of: First, just writing things down makes them more memorable. Second, reading your notes later jogs your memory. Research shows that notes do serve both functions.

Now consider how each function is affected by getting notes from the instructor. We might guess that those notes will be more complete and accurate than the notes you take. In fact, they will probably have all the deep connections that I explained are hard to capture while you are listening. So they would seem to be quite good for the memory-jogging function. But you won't get the memory boost that comes from writing things down. The instructor did the writing, not you.

Our guess—that using instructor notes is both a plus and a minus—matches what researchers have found. There's not a clear advantage to learners taking notes versus being given notes. That may be why some instructors don't provide notes—they don't see the point.

But suppose you do get notes or an outline or slides. What should you do with them? Although there's not a clear, research-based answer, we can make a reasonable guess, based on the two purposes of notes.

You still want the memory benefits that come from taking your own notes. So **take your own notes, even if you know you will get notes later**. And if you get them before the lecture, don't bring them with you, figuring you will follow along and add your own observations to them. You're not going to get the same memory boost, and trying to simultaneously listen to the lecture and line it up with the written outline can get confusing. The same goes for PowerPoint slides: don't print them and take notes on them.

If you get notes or an outline before the lecture, look them over. You don't need to spend a long time doing it. Just **identify the top two levels of the hierarchical organization of the lecture**: What's the overall theme, and what are the main subpoints?

Knowing this information in advance provides a big advantage to your comprehension and your note taking. Write the theme and subpoints at the start of your lecture notes for easy reference. Then, as the lecture progresses, you'll know where you are in the overall lecture organization, and you can mark it as you go.

You'll still want to **coordinate your notes with the instructor's notes later**. That's obviously your only option if the notes are available only after the lecture, but even if you get them beforehand, afterward is the time they'll prove most useful. The process of working with your notes after you take them is so important that I devote all of chapter 4 to it.

In a sentence: If the speaker provides notes or an outline, use them to aid your comprehension before or after the lecture, but don't consider them a replacement for your own notes.

TIP 4

Be Thoughtful About When to Read Assignments

There's often some assigned reading associated with a lecture, and you're supposed to show up having read it. The logic "read first, then listen" seems obvious; you will understand the lecture better if you already know something about the topic. Recall that when people write or speak, they exclude some information that their audience needs for understanding, on the assumption that listeners have that information in memory. That was the point of the example concerning Shirley Temple movies; the instructor assumed that the students knew that the Great Depression had occurred during the 1930s and that they would conclude that the economic circumstances primed people to enjoy this kind of film. You will understand more if you already know something about the topic, so doing the reading first will help you understand the lecture.

But it turns out that the reverse is equally true. If you go to the lecture and then do the reading, you'll understand the reading better.

Making the right decision—reading first or lecture first—really depends on what the instructor assumes you know when you walk into the lecture hall. On the one hand, if you diligently do the reading first and then the speaker explains all the content you read but is clearer than the

book was, there was obviously no reason to do the reading in advance. On the other hand, if you don't do the reading and the lecturer assumes you know that content and goes beyond it, you will definitely be confused.

The key to answering the question "Should I do the reading before or after the lecture?" is knowing what the instructor assumes you've gotten out of the reading before you come to the lecture. Of course, you can simply ask the instructor what they expect. They will likely say they want you to have done the reading beforehand. Still, they may not *teach* that way.

For example, when I was in college, I took a course in epic poetry: we read the *Iliad*, the *Odyssey*, *The Song of Roland*, and several other works. I found each of them pretty difficult to understand, and I don't mean anything very deep by *understand*; I mean I had trouble following what happened in the poem. We were to come to class having read something like fifty pages, and the professor would lecture, focusing on historical and cultural information that helped put that bit of the poem into context.

About the third week I noticed that the instructor started each session with a summary of the reading; he'd provide the basic outline of events in three minutes. So I started doing the reading after I attended class. Having his skeletal summary in mind made it much easier for me to comprehend the poem. And not having read it before class didn't affect me much because he had provided the summary, so I could more or less follow the historical and cultural material.

If you find the instructor's lectures quite easy to follow but find the readings difficult, try reading after the lecture and see if it helps.

> ***In a sentence:*** The second time you encounter material, it's easier to understand, whether you're reading it or hearing it; plan your reading and listening accordingly.

TIP 5

Get Over Your Reluctance to Ask Questions

Earlier in the chapter, I described how a failure to understand can slip by you. But other times you know darn well that you don't understand. If it happens while you're listening to a lecture, the solution would seem to be simple: stick your hand in the air and say, "Wat?" For many people, it *is* that simple. But others are reluctant to ask questions, usually because they (1) "don't want to be annoying," (2) "don't want to look stupid," or (3) "are shy."

If you don't want to be annoying—great! Instructors don't want you to be annoying, either. And your caution about asking questions is not foolish, because although instructors often say, "All questions are welcome!" this statement is dishonest. Annoying questions are not welcome, and some questions are annoying. You'll be less reluctant to ask questions if you know which ones they are.

Questions people ask just to show off are annoying. "Mr. Willingham, don't you think what you've been saying about the history of nineteenth-century Europe relates to the anatomy of tree shrews, which by the way I've been reading about?" No, what I've been saying doesn't relate, and you only asked because you have something *you* want to say about them, and everyone knows it. Don't use my lecture as a platform to show off what you know, with a "question" as your cover.

Questions that sidetrack the speaker shouldn't be annoying but do bother some people. "Mr. Willingham, don't you think what you've been saying about the history of nineteenth-century Europe could be related to the imminent collapse of the aristocracy?" Unlike the tree-shrew business, this question makes sense in light of the subject, so the listener

probably isn't just trying to show off. But it will make a few listeners roll their eyes, and I understand why. They are thinking, "You're taking up time with a topic that the instructor didn't think was important enough to include in the lecture. It's great that you're interested (I guess), but why should we all have to listen as you indulge your enthusiasm?" Most people don't hold this attitude, and they recognize that curiosity should be tolerated (at the least) in a setting in which people aim to learn. But if you're very anxious about annoying a few people, fine, don't ask questions that explore new terrain. Talk to the teacher on your own.

The type of question that never annoys others is the one you're most likely to ask: questions of clarification. You miss a definition, so you ask for it to be repeated, or you know I said there were three reasons something is true, and you got only two of them. Fellow students who did get the information understand that everybody misses things now and again, and to the extent that you're "slowing things down," it's for all of ten seconds.

Now, what if the instructor just spent the last fifteen minutes explaining something complicated—say, the octet rule in chemistry—and you realize you Just. Don't. Get it. Can you ask the instructor to explain everything again? You might worry that everyone else must have understood, so asking for clarification will make you look stupid. It's different from the I-missed-what-you-just-said question because it requires understanding. You're not saying, "I didn't hear that," you're saying, "I heard it, but it didn't penetrate my thick skull." Furthermore, the explanation was long, so concern over wasting time is not unreasonable.

The way you phrase your question can alleviate some of each concern. Ideally, you won't just say, "Uh, can you explain that again?" You'll start by saying what you *do* understand. That will help the instructor focus the explanation (making it shorter) and has the side benefit of showing everyone you're not hopeless; you understood some of it.

If you are a worrier, that advice might help, but it's probably not

enough. To go a little further on this issue, I'll ask you to get out of your own head for a moment and take the teacher's perspective.

When you ask a question, you're not just helping yourself. **Questions provide feedback to the instructor.** A half-decent teacher is always scanning faces, trying to gauge whether people look puzzled, but that goes only so far. Direct feedback is better.

When it comes to wasting class time to reexplain something: that's not really your call. I'm the instructor, and I'll decide whether or not it's a waste of time. In making that decision, I'll weigh factors such as how quickly I can reexplain it, how many people besides you are probably confused, and what else I need to cover. If I think it's not worth it, I'll say, "I really need to move on, so let's connect afterward on this." Don't take the "blame" for slowing down the group. It's the instructor's decision.

Finally, let me address the "I'm shy" reason for not posing questions. Being ready to ask questions and to admit ignorance is not just a technique for short-term gain in classes; **it's a skill you need to master.** Everyone's job has duties that run counter to their personality or abilities. For example, an extrovert may love that his sales job requires constant contact with new people, but he still has desk work to do in the home office one day a week. If you're shy, you'll still need, on occasion, to speak up and ask questions to make sure you know what's going on. Can you imagine a navy pilot failing to understand a mission briefing and thinking, "I don't want to ask a question and look stupid. I'm sure I'll figure it out when I'm in the air"?

So if you don't like to ask questions, don't view that as "part of your personality" and therefore unchangeable. View it as a skill like any other and one you need to work to improve. If you can, sit in the front row so you can't see everyone else; you might feel less self-conscious. Try asking a *short* clarification question about a definition, just for the practice. If you're reluctant to raise your hand and you have a relationship with the

teacher, maybe tell her you're working on this skill; she may become more sensitive to times when you're trying to break in. Asking questions may never feel 100 percent comfortable to you, but the more you make the effort, the easier it will become.

> ***In a sentence:*** Know which types of questions are annoying and which aren't, and if asking the harmless type of question still makes you anxious, view it as a skill you should master.

For Instructors

How can an instructor help listeners understand the high-level connections that they often miss? Obviously, you should make these connections easy to appreciate by making the organization of your talk explicit.

I find that the simplest method is a preview of the lecture—a slide with a list of the topics that I'll cover, corresponding to the second level of the hierarchy that I mentioned. I spend thirty seconds reviewing it, and then each time I move to a new topic, I return to the slide to show where we are. There's research showing that verbal signals help, too, with or without a slide of the outline. Start by telling your listeners the organization to come, for example, "There are five ways that the consolidation of media companies has affected Hollywood." Then begin your discussion of each by referring back to this organization, e.g., "The third way that the consolidation of media companies has affected Hollywood . . ."

Now, what about this listening-takes-work business? People set a low bar for thinking they understand, so they need your help in knowing whether they've really done so. You can use clicker questions that test what you've just taught, but students find such comprehension questions irritating, and they don't encourage deeper thinking. I prefer to pose a discussion question that requires using the new concept and having stu-

dents turn to their neighbors and talk about it for thirty seconds. This makes it obvious to students whether they understand a concept well enough to use it.

But recognizing that they don't understand may not be enough to get them to ask a question. They need to feel comfortable doing so, and your body language and facial expression are important cues to your openness. Try videoing a lecture and watch yourself with the sound off, focusing on moments you ask for questions. Do your face and body show openness, eagerness? If you can't tell, ask someone else.

Your reaction to questions is a key determinant of class atmosphere, and the best test case is when a questioner makes it obvious that he wasn't listening. If you shame the questioner, even obliquely, everyone else gets the message: there *are* stupid questions, and those who ask them will pay. Just answer the question at face value and briskly move on.

Even more, look for opportunities to praise questions. Actually, I more often praise the thought that went into the question, rather than the question itself, by saying something like "Oh, that's an interesting insight" to acknowledge that the question had some thought behind it. And there's nothing wrong with pausing after a question to show that you're thinking about it, taking it seriously.

A final note: If your students consistently do *not* ask questions, you should wonder about your relationship with them. They are not quiet because your explanations are so brilliant and clear. They're quiet because they see asking a question as taking a risk. Ask yourself why that is.

Summary for Instructors

- Start a lecture with a visual preview of the organization.
- Return to this preview as you transition to a new topic.
- Reinforce this visual cue about the transition with a verbal cue.

- To help listeners evaluate whether they are understanding, pose questions that require people to *use* the information they have just heard.
- Encourage questions by showing through your facial expression and body language that questions really are welcome.
- When appropriate, praise questions.

CHAPTER 2

How to Take Lecture Notes

Understanding a lecture is hard, and taking notes obviously makes that hard job more difficult—it's an added task. It's no surprise that people don't do it very well. Research shows that if a lecturer lists the points she thinks are important enough to make it into listeners' notes and then examines the notes listeners actually took, she'll see that they captured between 25 and 50 percent of them. That figure doesn't change from middle school through college.

It's not that people are lazy or stupid. Taking perfect notes is literally impossible, because lectures move too quickly. People can speak about six times as quickly as they can write (120 versus 20 words per minute). **Taking good notes requires making wise compromises.**

Items 1 and 2 in the list below describe the mental processes required to understand a lecture. Items 3 through 7 describe the added mental processes required when you take notes.