

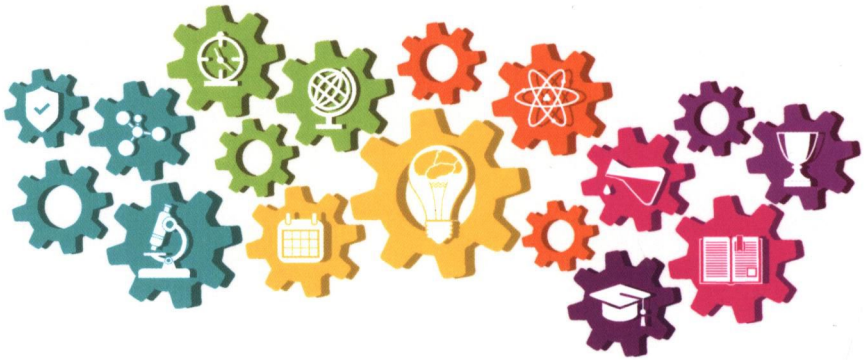
# HOW WE THINK AND LEARN

*Theoretical  
Perspectives  
and Practical  
Implications*

Jeanne  
Ellis  
Ormrod



Written in a conversational and engaging manner, *How We Think and Learn* introduces readers to basic principles and research findings regarding human cognition and memory. It also highlights and debunks twenty-eight common misconceptions about thinking, learning, and the brain. Interspersed throughout the book are many short do-it-yourself exercises in which readers can observe key principles in their own thinking and learning. All ten chapters end with concrete recommendations – both for readers’ own learning and for teaching and working effectively with others. As an accomplished researcher and writer, Ormrod gives us a book that is not only highly informative but also a delight to read.



Jeanne Ellis Ormrod received her AB degree in psychology from Brown University and her MS and PhD degrees in educational psychology from The Pennsylvania State University. She was Professor of Educational Psychology at the University of Northern Colorado until 1998 and is now Professor Emerita in the university’s School of Psychological Sciences. Although she no longer conducts her own research on learning and cognition, she remains an avid reader of psychological and educational research, stays in touch with many of her professional colleagues around the world, and continues to update her popular college textbooks in human learning, educational psychology, and research methodologies. *How We Think and Learn* is her first book with Cambridge University Press.

Cover illustration: zonadearte / Getty Images

Cover design by James F. Brisson

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[www.cambridge.org](http://www.cambridge.org)

ISBN 978-1-316-61684-0



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Implications

Jeanne Ellis Ormrod  
*University of Northern Colorado*



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One Liberty Plaza, 20th Floor, New York, NY 10006, USA

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[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781316616840](http://www.cambridge.org/9781316616840)

10.1017/9781316691458

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First published 2017

Printed in the United States of America by Sheridan Books, Inc.

*A catalogue record for this publication is available from the British Library.*

ISBN 978-1-107-16511-3 Hardback

ISBN 978-1-316-61684-0 Paperback

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## HOW WE THINK AND LEARN

### Theoretical Perspectives and Practical Implications

Written in a conversational and engaging manner, *How We Think and Learn* introduces readers to basic principles and research findings regarding human cognition and memory. It also highlights and debunks twenty-eight common misconceptions about thinking, learning, and the brain. Interspersed throughout the book are many short do-it-yourself exercises in which readers can observe key principles in their own thinking and learning. All ten chapters end with concrete recommendations – both for readers' own learning and for teaching and working effectively with others. As an accomplished researcher and writer, Jeanne Ellis Ormrod gives us a book that is not only highly informative but also a delight to read.

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## ACKNOWLEDGMENTS

Although I am listed as the sole author of this book, I have hardly written it alone. In particular, I must thank the countless psychologists and other scholars who have conducted the research studies and developed the theoretical perspectives that have shaped my thinking about human learning and cognition over the past 50 years. If I were to list all of them in the footnotes and reference list, this would be a very long book indeed.

I must also thank four individuals who have helped me turn my ideas into the concrete reality that is *How We Think and Learn*. Dave Repetto at Cambridge University Press recruited me to write the book, and together we conceptualized a work that can (we hope) appeal to a broad audience of readers. Megan Ferrara created several arts that illustrate certain ideas in delightful visual form. And with their attention to both the big picture and many nitty-gritty details, Joshua Penney at Cambridge and Sathish Kumar at Integra transformed my manuscript into the final product you see before you.

A special shout-out goes to Adrienne Starrs, who has, over the past 15 months, doggedly and yet graciously persisted in her efforts to stretch my mind and fingers in new musical directions. In doing so, she has not only enabled me to improve my piano-playing ability but also expanded my conceptions of what expert instruction and effective learning are all about.

Finally, I will be eternally grateful to my husband, Richard, who has been my cheerleader throughout this and previous book-writing projects, and to my children and grandchildren, who have given me many great examples of human cognition and learning in action.





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## The General Nature of Human Cognition and Learning: Probably Not Quite What You Think It Is

We human beings are hardly alone in our ability to learn from our experiences. Even snails and earthworms can acquire and remember new behaviors as their environmental circumstances change, and many mammals and birds can learn new skills simply by observing and modeling what their human or nonhuman companions do.<sup>1</sup> Yet as members of the species *homo sapiens* – Latin for “wise man” or “wise human” – we have several capabilities that far exceed those of our fellow residents on Planet Earth.

Key among our exceptional talents is an ability to communicate with one another using a grammatically complex and very flexible *language*. Our language provides a critical means through which we learn from other people’s experiences and guidance. For example, if you want to fix a broken bicycle or bake chocolate chip cookies, you can ask other people – or read books or websites that other people have written – to guide you through the process. In addition, as you’ll discover in Chapter 3, language also provides an important resource for *thinking* about our experiences.

Another thing that sets us apart is the fact that virtually all of us humans live within a certain *culture* that not only helps us learn new things but also serves as a repository of what we have collectively learned as a group.<sup>2</sup> Consider our many books, museums, universities, and Internet websites; all of these serve as shared “memories” of what various civilizations have learned over the ages.

Finally, much more so than is true for any other species, we human beings can *self-reflect* about the things we have learned and about our thoughts in general.<sup>3</sup> For example, we can mull over and evaluate our own and other people’s ideas about, say, social or political issues, and we can integrate the many tidbits of information we’ve obtained from various

sources to draw conclusions, speculate about implications, and solve new problems.

Such mental self-reflection is known as *metacognition*, a topic we'll explore in depth in Chapter 7. But in fact, this entire book is the result of countless researchers' attempts to reflect on and try to explain the nature of human thinking and learning. In this short book, we can only skim the surface of what has become a complex, multifaceted, exponentially increasing field of scientific inquiry. Nevertheless, as your author, I'm hoping that by the end of the book, you'll have a better understanding of how we humans think about, learn, and remember aspects of our day-to-day experiences – and why we often *don't* think about, learn, and remember them. I'm hoping, too, that you'll be able to apply your new knowledge both in your own future learning activities and also in your efforts to help others learn effectively – whether such efforts be in a role as parent, teacher, workplace supervisor, journalist, website designer, or general member of our society and culture.

#### WHAT WE USUALLY *DON'T* AND *CAN'T* DO WHEN WE THINK AND LEARN

In my own experiences as a psychologist, teacher, parent, friend, consultant, and citizen, I've found that many people have significant misconceptions about what our minds can do for us. I'll be presenting common misconceptions throughout the book – 28 of them altogether – and again in the Appendix that immediately follows Chapter 10. For now, I want to alert you to three especially pervasive ones.

Misconception #1: That our minds mentally record every piece of information we encounter

Many people mistakenly believe that somehow we absorb and mentally “keep” everything we see and hear. But as you'll see in upcoming chapters, and especially in Chapter 4, we really don't have the hardware and software to save every tidbit that comes our way. Much as we might like them to be, our minds aren't video cameras or audio recorders. Ultimately, we probably capture only a tiny fraction of the environmental stimuli that bombard us at every waking moment.

Misconception #2: That our minds record information exactly as we receive it

Quite the opposite is true. Right from the get-go, we humans mentally *do* something with much of the information we get: Our minds change and condense it in ways that enable us to remember it more effectively. Thus, we should never assume that our recollections of information and events are accurate ones. Nor should we assume that other people's recollections are accurate, no matter how confidently and self-assuredly those individuals describe the "facts" of the matter.

Misconception #3: That occasional forgetfulness is a sign that something is wrong with our mental hardware

No, not at all. Some absent-mindedness is perfectly normal in people of all ages. Usually the problem isn't one of forgetting something altogether, but rather of failing to remember it *when we need it* – for example, completely forgetting about errands we've wanted to complete or appointments we've made for later in the day.

Chronic forgetfulness can sometimes indicate significant mental impairment or decline. But especially if we lead complicated lives with many distractions, virtually all of us occasionally forget something we've really wanted to remember. I'll talk more about this problem, including strategies for addressing it, in Chapter 6.

#### WHAT WE TYPICALLY DO DO WHEN WE THINK AND LEARN

Over our long history of evolving to become the species *homo sapiens*, we have ingeniously adapted to the limitations of our biology-based mental equipment. Two general principles characterize key strategies we use to make the most of our experiences. First, *we summarize and try to organize the information we obtain from our environment*. We seem to be predisposed to find patterns and consistencies in what we observe. This inclination toward identifying regularities in our world appears quite early in life, and it's undoubtedly a central reason why we acquire language as quickly and easily as we do.<sup>4</sup>

To see this summarizing/organizing principle in action, look at Figure 1.1. I doubt very much that you see only black marks scattered randomly about. Instead, you probably see several rows of circles, and you probably also see the larger circles forming two diagonal lines that crisscross each other in the middle. Perceiving all of these things – the circles, the rows, the diagonal lines, and the crisscross – reflects your own mental efforts to organize what you're looking at.

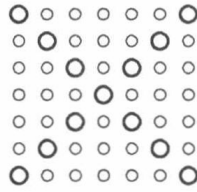


FIGURE 1.1. What do you see here?

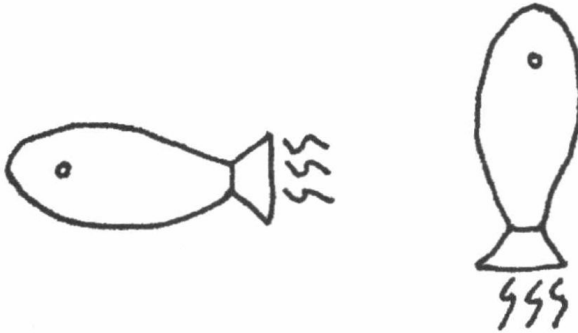


FIGURE 1.2. Here are two views of the same object. What might this object be?

I'm guessing that, in addition, you see the letter *X* in Figure 1.1, which illustrates a second general principle: *We try to impose meaning on the information we obtain.* As a rule, we humans seem determined to make some sort of sense of our experiences. At our very core, we are meaning makers. To see what I mean, look at Figure 1.2, which shows the same object in two orientations, one being a 90-degree rotation of the other. What is this object? Give it a label of some sort.

If you focus your attention on the left-hand version of the object, you might think that it's a fish or submarine going through water. If, instead, you look more closely at the right-hand version, you might perhaps think that it's a rocket ship launching into space. In each of these cases, you might interpret the three squiggly lines as indicating some sort of *movement* of the object. Alternatively, you might think of the squiggly lines in the right-hand version as reflecting the movement of *air* – perhaps as a vacuum cleaner sucks up dirt from a carpet. The object isn't necessarily a fish, submarine, rocket, or vacuum cleaner, of course; it could be something else altogether, or it could be just a collection of black marks that have no meaning whatsoever.

Sometimes most of us can agree on the meanings we attach to certain objects or events. For example, if we see objects of a particular shape moving in a particular way in a lake or river, we might all agree that those objects are “fish.” And we’d probably all agree that we’re looking at a “vacuum cleaner” if the object makes an irritating noise and if a person is moving it slowly and systematically across a carpet.

On other occasions, we might have trouble reaching consensus about what something means. For instance, people’s body language can be notoriously ambiguous and hard to interpret with certainty. What does it mean when a person *smiles* at you? Is the person simply feeling happy? offering a gesture of friendship? feeling smug about winning a highly competitive event? trying to manipulate you in some way? It could be any of these things.

EMPIRICAL AND THEORETICAL BASES FOR  
THE BOOK

As I continue to talk about human cognition and learning in the pages ahead, I’ll be basing my statements on research findings in psychology, neuroscience, and such related fields as neuropsychology and the learning sciences. (These fields overlap considerably, with various theorists often disagreeing about where one field ends and another begins.) Although I’ll occasionally be able to describe specific processes that occur in the brain, for the most part I’ll be relying on studies of observable, measureable human behaviors. Such is the nature of psychological inquiry: to observe what people *do* and then draw reasonable inferences about how people *think*.

If you have some background in psychology, you may notice that I don’t cite my sources in parentheses within the text. Thus, I don’t use the writing style that the American Psychological Association (APA) recommends. Instead, I cite my sources in “Endnotes” sections at the end of each chapter. My reasoning for this departure from APA format is simple: Lists of many names and dates within a paragraph can be quite a distraction for readers whose primary goal is to *understand* what I’m saying. By all means, please make use of the sources I cite in the endnotes to learn more about particular points I make in the book.



## DEFINING BASIC TERMS

Before we go any further, you and I need to be on the same page regarding the meanings of certain words. Following are a few terms that are central to the entire book.

First, consider the title of this first chapter: “The General Nature of Human Cognition and Learning.” Psychologists often use the term **cognition** to encompass all the internal mental processes that occur in our heads as we go through our daily lives. Many psychologists also make an implicit distinction between *brain* and *mind*. The **brain**, of course, is our basic thinking hardware; it provides the neurological underpinnings for everything we do mentally. By the term **mind**, psychologists are often referring to *psychological* phenomena either in addition to or instead of *physiological* phenomena. For example, the concept of mind encompasses the many memories we experience, the many mental strategies we use to help us learn and remember things more effectively, and our general awareness of ourselves as thinking, remembering, and forgetting individuals.

Is the mind nothing more than a collection of brain-based processes – that is, are mind and brain one and the same – or do our minds also involve processes that in some way transcend our physical brains? And what about our general awareness of ourselves as thinkers – that is, our consciousness? Such existential questions are likely to remain unresolved for the foreseeable future.<sup>5</sup> Thus, I’ll largely ignore them in this book, although I’ll touch briefly on the concept of consciousness in Chapter 4.

Two other key concepts are *learning* and *memory*. For purposes of this book, the word **learning** refers to a long-term change in mental representations or associations as a result of experience. Three parts of this definition are important to note. First, learning involves a *long-term change*: It has an impact for quite a while, although not necessarily forever. Second, learning involves a change in *mental representations or associations*; in other words, it’s an internal, mind- or brain-based phenomenon.<sup>6</sup> And third, learning is a *result of experience*; it isn’t a change due to, say, mood swings, fatigue, mind-altering substances, or the onset of mental illness.

Meanwhile, the word **memory** can be used in either of two ways. In some instances it refers to a general ability to retain information or skills over a lengthy period. In other cases it refers to a specific “location” where ideas and skills are saved – for example, in “working memory” or