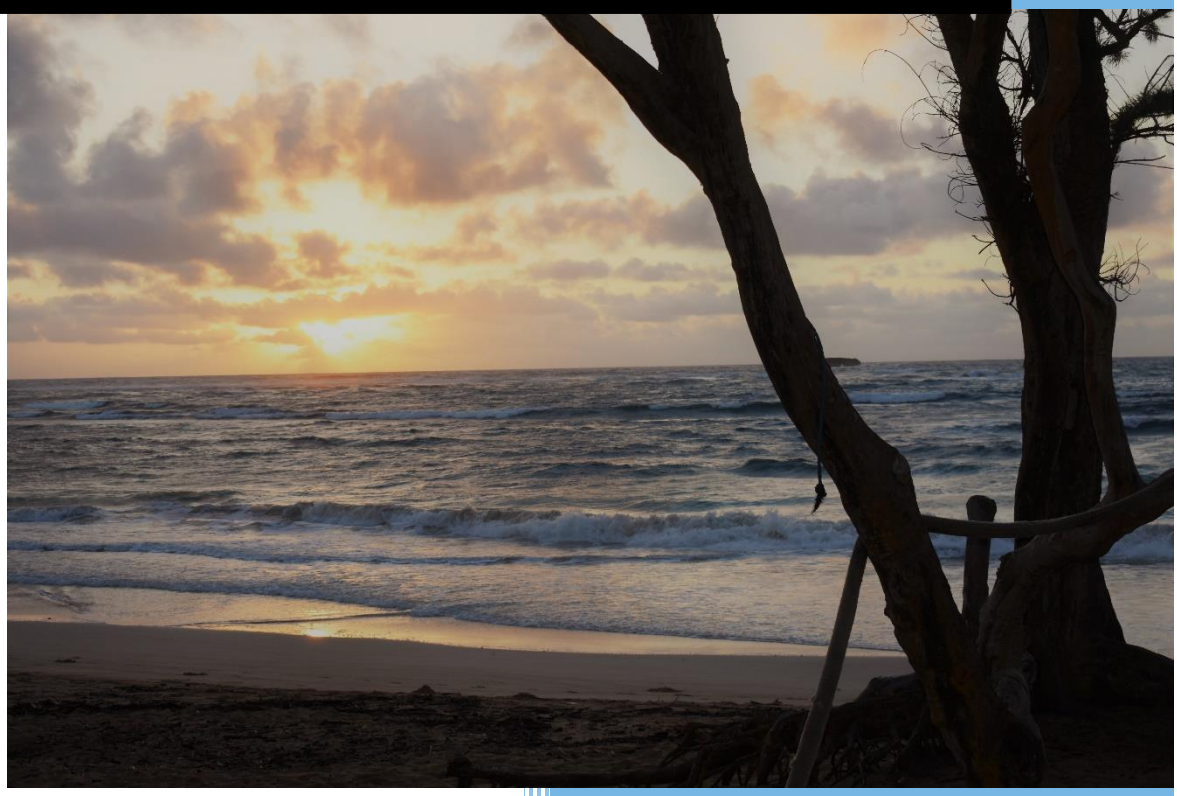
2018

Building Academic Literacy



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Building Academic Literacy

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Preface for Instructors

This book focuses on four important academic skills all college students must master:

1) Taking notes on lectures
2) Writing academic essays
3) Reading college level texts
4) Participating in discussion

Our Approach

While many study skills, composition and reading skills texts separate these activities into discrete skills to be learned separately, this books recognizes that these skills are inter-connected. A student who struggles with the reading will have a hard time writing about it or discussing it. A student who has inadequate strategies for listening to lectures will struggle to see the connections between the lecture and the reading.

Therefore, this book moves away from the "skills and drills" texts that are so common in reading and writing textbooks. Instead, this book features process and provides opportunities for students (and instructors) to think about the best ways to approach academic tasks. For example, a "skills and drills" oriented book might teach students how to take Cornell Notes and use graphic organizers, but it does not provide any information for students that would allow them to decide when it would be best to choose one note taking method over the other. This book's main focus is helping students develop that sort of judgement.

Like most textbooks, this book recognizes that that successful discussion participation, college-level reading, academic writing and lecture note taking don't just "happen." However, this book uses an easy-to-remember analogy students can apply successfully to all four academic processes. That analogy is the "warm up," "work out," and "cool down" which helps students understand that each academic activity requires pre-planning, (warm up) that students must thoughtfully choose from a variety of strategies to accomplish the academic task at hand (work out) and they must deliberately consider their studying to determine what they did (or did not) accomplish (cool down.)

The book makes the point that there are many ways to "warm up," "work out," and "cool down," and students need to consider their goals, the structure of the text they must read and their own

preferences before choosing a study method. For example, if a student is taking a sociology class in which the main method of evaluation is multiple-choice exams and discussion participation, he should carefully select study activities that will prepare him for multiple choice exams and discussions. However, if the instructor changed her mind in the 8th week of the semester and began giving essay exams as opposed to multiple-choice ones, the student should realize that the way he studies needs to change along just like the test has.

Finally, this book is not designed to be the sort of text students can use independently of an instructor. The types of students who enroll in study skills class, as well as lower-level reading and writing classes, benefit from conversations with instructors who can help them think through how to approach an academic essay, or how to select the best warm up activity for reading a Biology text book. As a matter of fact, this book will deliberately sate “Your instructor will help you decide the best strategy for reading this text, taking notes on this chapter, etc.”

The Book’s Structure

This book follows this basic structure:

Chapter one provides information about strategies and introduces students and instructors to the “warm up, work out, cool down” concept. Each chapter after that features college-level reading—in some cases, we include a textbook chapter, in others, we have pulled essays from on-line sources. In most chapters there are also links for TED Talks or other on-line lectures.

In each chapter, students will be asked to develop a study plan that involves selecting the best strategies for reading the materials, preparing for various types of exams, participating in discussion and listening to lecture.

Instructors will help students develop and then follow-through on their study plans.

We sincerely hope that this book will work for you and your students as you work together to develop academic literacy. However, the beauty of an Open Education Resource is that it is flexible—hopefully, it will enhance your own pedagogical creativity!

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Author Biographies

Lori-Beth Larsen

Lori-Beth Larsen earned an MA in TESOL from St. Cloud State University. She has a BA in Ethnomusicology from the University of Hawaii and a Reading certification from Minnesota State, Mankato. She has been teaching for about 25 years. Her background in teaching English to speakers of other languages lead to many discussions with Kathryn about the rhetorical background and communication preferences of students in developmental classes. She recognized that students were coming from non-academic dialects, meaning that they often didn't understand how they were expected to participate in academic settings. This book focuses on integrated communication skills (reading, writing, listening, and speaking) and deliberately teaches the academic rhetorical patterns.

Kathryn Klopfleisch

Kathryn earned an MA in English and another one in Reading from Minnesota State, Mankato. She has been teaching for about 25 years and has a deep interest in developmental students. She has engaged in two research projects—the first one simply posed the question "What do 'A' students do that 'D' students don't?" and then "What can we do to get 'D' students to act more like 'A' students?" Much of the material in chapter one comes from her study. The second research project involved working with faculty that taught reading intensive courses such as Philosophy, Psychology, and Earth Science to conduct reading and study skills workshops for students who failed the first exam. Through these workshops, she learned how many students struggle because they don't have an effective note taking strategy, or they are unable to pick main ideas out of a text. However, once students were given concrete strategies for studying, their grades began to improve.

Chapter 1: Academic Survival Skills

The purpose of this book is to introduce you to and help you practice four important skills all college students must have to be successful in college-level classes. These processes are:

1. Reading College-level Materials. College level materials will include your textbooks, but also scholarly articles and books that are not textbooks. Different kinds of college level materials require different reading skills and approaches, and you will learn them in this book.

2. Writing Academic Essays. Many of your college classes will require you to write academic essays. It is important to note that academic essays are different from other kinds of writing you may have done for high school. They are not the same as book reports, journals or creative writing because they have a structure unique to them. You will learn about that structure in this book.

3. Listening to Lectures. Many of your professors of instructors will rely on lectures to give you the information you need to learn in the course. In many cases, your instructor will lecture over material that is not in the book, but will be on the test, so it is important to know how to listen to lectures and take notes on them you can use later when you study. This book will cover strategies for listening to and taking notes on lectures.

4. Participating in Class Discussion. Many of your classes will require you to participate in on-line or in-person discussions over the materials in the course. Sometimes, the purpose of a discussion is to argue your stand on an issue. Sometimes, it may be to achieve a specific goal—like summarizing the main ideas in a chapter or brainstorm ideas for an upcoming project. For you to be successful in class discussions, you need to understand your instructor's purpose for having a discussion and then you need to know how to prepare for one.

Warm up, Work Out, Cool Down

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If you have ever played a sport, sung in a choir, acted in a play or been a dancer, you know what it takes to be a successful student.

You probably noticed that practices and rehearsals follow a pattern—first you **warm up**. That might mean stretching, singing scales, or rehearsing lines.

Next, you **work out**. This is the longest part of a practice or a rehearsal and it involves actually doing the thing you will need to do in the concert, game or play. You run plays, say your lines or sing the songs you will perform during the concert.

Finally, you **cool down**—for many rehearsals or practices, a cool down has two parts. One is to get muscles to relax and get the heartrate back to normal, but there is a second purpose to a cool down. Your coach or director will often talk about what went well during that day's practice, and then he or she will talk to you about what needs to happen to get ready for the performance or the game.

Guess what? Studying follows the same process practices and rehearsals do. The major differences are that you do not have a coach or a director that helps you decide how to study and the other difference is that studying is not public the way rehearsals and practices are. When you study, no one can look at you and know what you are thinking, if you understand the material or if you are making the best choices you can to prepare for the test. However, in sports and music, your choices are out in the open—everyone can hear it when you sing the

song correctly, and everyone can tell if you make the basket or hit a home run. If you cannot do these things, you coach or director can hear or see what you are doing wrong and help you correct yourself.

Because studying is private, it is much harder to know if you are doing things correctly, and that is why this book is so important!

The chart below explains the purpose of an academic warm up, work out and cool down:

	Purpose
Warm-up	Your brain actually remembers information better if it warms up. You warm up your brain by preparing it for the academic activity that it must do. If you are preparing for a discussion, for example, you can ask yourself, “Why is my instructor going to have a discussion? What do they hope I will ‘get out’ of this discussion?”
Work out	In academics, the purpose of the workout is to learn the material you need to know in order to be successful in the class. This might involve reading, jotting down ideas you might wish to share in discussion, or taking notes on a lecture.
Cool Down	In academics, the purpose of a cool down is to do two things—one, make some decisions about what you did during your workout that is important enough to remember and two, plan ahead. What will you need to study tomorrow? What confuses you and how can you get help with your confusion?

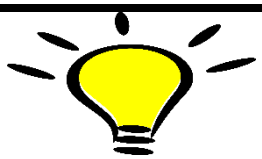
Academic Skill: Focus on Reading College-Level Materials

A good college reader warms up, works out then cools down.

Here is how that process applies to reading college level material:

	Activity
Warm-up	To warm up your brain, spend a few minutes looking over the material you need to read. Read the headings and subheadings. Look at graphics and pictures if there are any. Ask yourself “What will I be learning in this reading?” “What ideas seem to be important?”
Work out	To work out in reading, you need to read! But it isn’t that simple. You need to have a note taking strategy that will allow you to do two things: 1) Figure out what information is most important and 2) Remember that information.
Cool Down	To cool down in reading, see what you can remember about the reading by stating main ideas in your own words, telling a friend what you learned or asking yourself “Which ideas did I read tonight are so important they might end up on an exam?” You can also make a list of things that confused you that you can ask your instructor or a tutor.

In reading, we call the warm up “pre-reading,” the work out “during reading” and the cool-down “after reading.” Whenever you read college-level materials, you need to have strategies for pre-reading, during reading and after reading, just like a good coach will have specific strategies for warming up, working out and cooling down.



Good to Know . . .

***How* you read depends on *what* you are reading and *why* you are reading it . . .**

Many students approach all reading the same way—it doesn't matter if they are reading a chapter out of a Psychology textbook or a short story in an English class. They take notes in the same way (or don't take notes at all) or they study in the exact same way—for example, they memorize important terms and dates no matter what they are studying.

Imagine if the same coach coached both swimming and basketball. She wouldn't have her teams do the exact same thing in practice because each team has very different goals—the first team wants to swim faster, the second one wants to win basketball games. The practices need to be very different because the goals of the athletes are very different.

Reading is the same way— if you know you will have a 50 point multiple choice test in your history class, and an essay test in your Public Speaking Textbook, you should read your history textbook differently than you do your Public Speaking textbook because your goals are different.

Your instructor or tutor will help you decide which strategies to use for what type of reading. However, there are three things to take into consideration about any textbook, article or essay you read that will help you select a good strategy. They are:

1. *Structure*- The very first thing to consider about your reading is how it is structured. Does the author seem to be comparing and contrasting two or more people, ideas, places, processes or events? Does the author seem to be describing how a process such as passing a law, photosynthesis or the evaporation cycle happens? Does the author seem to be defining important terms or concepts? Your instructor will help you notice how your textbook chapters or other reading are organized, and once you have figured out the author's goals, it is time to consider Purpose.

2. *Purpose*- the second thing to consider about anything you read is what is YOUR purpose for reading the material? Will you have to write a paper over it? Participate in a class discussion? Take a multiple choice test over it? Take an essay test over it? What you will have DO with the information you read should help you determine what strategies you should use to get the most out of your reading. Again, your instructor or tutor will help you think through what strategies will be the most effective ones to use to achieve your purpose.

3. *Preferences*- The final thing to consider is your preferences. Once you have determined the structure of the reading and thought through the purpose, the last factor you can weigh in is how you would like to take notes—which strategies are the most effective for you? Which ones seem to fit your learning style the best? The more experience you have using strategies, the stronger your preferences will become.

Below are the pre, during and after reading strategies you will focus on in this class. All of the strategies can be adapted to work better for you and your instructor can help you figure out the best ways to do that. For now, you can skim the strategies so you are familiar with them and in class you can learn how to use them and which ones are appropriate for what kind of reading.

Warming up to Read

The three strategies described below should be used before you actually read. You might wish to do just one strategy, or it might make sense to use more than one.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There questions about studying in a group if you join a study or tutor group. **Chapter Information** The test over this material is on _____. How many pages will I have to read each day to complete the reading before the test? _____ How many sections are there in this chapter? _____ **Group Information (If you're meeting with a group.)** This group will meet again on _____. By then, I will need to read ___ pages and ___ sections. **Time Management** *Date_____

	Time I began reading_____ Time I ended_____ # of pages completed_____ *Use this information to calculate how long it will take you to complete the chapter so you can make an accurate schedule.

Pre-Reading Strategy 2: The Foundation Builder	Lay a good foundation for your reading by examine the headings, the subheadings, and the graphs in the entire chapter. Headings tell you what the chapter will be about, which prepares your mind and helps you read more efficiently. Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer	It is important to know where you've been before you move on to somewhere new. You have about 24 hours to review information you learned when you study before you forget it forever. Here is a technique for reviewing book notes: Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Working out while Reading

While you are reading, you can't simply run your eyes over the words and expect to retain anything anymore than you can expect to sit quietly in the corner at a choir rehearsal and learn the songs. While you read, you need to have a way to interact with the material so you can remember it.

Strategy 1: **Connector**	As you read new sections of your textbook or book you need to relate the new information you are learning to what you have already read. **How does this section fit into the book?** How does this section connect to the previous section? Introduces a topic that: ➢ Supports the big main idea ➢ Describes another step in a process you are learning ➢ Describes events in the order in which they occur ➢ Other:_____ **How does section this relate to the lecture?** Does the lecture expand on ideas brought up in the book? Does the lecture cover different materials altogether? Does the lecture go over the book directly?

Strategy 2: **Illustrator**	Your job is to use pictures or graphs to represent the ideas in this section of your textbook. It is best if the graphic you pick will help you see the relationships between the different ideas you must learn. • Are you learning about a process or are you learning about events as they happened? Make a timeline.

	• Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. • Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. • Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3: **Note taker**	In this class, you will learn a variety of notetaking strategies. They might include matrix notes, graphic organizers, Cornell notes, outline style and others. If you feel that one of these note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section. Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

Cooling down after Reading

Many students make the mistake of completing the read they have to do for a particular day, closing the book and moving on to the next task. This is like the athlete who leaves practice before the cool down! In addition to risking injury to her muscles, this athlete also misses the end of practice conversations about what the team is doing well and what practices will

emphasize in the future. Students need to have a cool down to make sure they understand what they read that day and to think about what some good ways are to study in the days to come.

Strategy 1: **The Summarizer**	After you finish reading a section or your textbook or a chapter in a book, make it into a neat package by summarizing it. Look through the chapter section for key words. They might be terms, but they might also be words that show how terms are related. Once you have written down key words, put those words in a few sentences that you write in your own words—close the book when you do this. Once you're finished, open it up again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Key words: Summary without looking at the book: Summary after looking at the book and making changes.

Strategy 2: Test Buster	If you could guess what the question on the test will be, you'd have no trouble getting an "A." Find out what kind of questions you will be asked on the exam. Multiple choice? Fill-in-the blank? Short answer? Essay? Will it be open book? Know how many questions there will be, and how many points the test will be worth. Once you know all that, you will be a great position to make good, educated guesses about what the questions on the test will be. After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.

Think about It:

Let's say you are in an Interpersonal Communications class and you need to read a chapter on non-verbal communication. You find out that, after you read the chapter, you need to write a 600 word paper on non-verbal communication. Here is the assignment:

> Go to any public place—even the campus café. Observe a group of between two and four people communicating with one another and write a paper in which you explain what types of non-verbal communication your observed in your pair or small group.

Now that you know your purpose for reading is so you can apply the concepts you read about to real-life situation, go back and decide which pre-reading, during reading and after reading strategies would be the most effective? More than one answer could be correct.

Academic Skill: Focus on Writing Academic Essays

Much of the writing you will do for college classes will be Academic Essays—and they can be very different from one another. The essay you write in Psychology class explaining which coping mechanisms you have used in the last week is very different from the Biology paper in which you need to explain how cells divide, but they are both academic essays.

A good college writer warms up, works out, then cools down. Here is how that process applies to writing college-level papers:

	Activity
Warm-up	To warm up your brain, carefully read the prompt you were given for your paper. (A prompt is the assignment your instructor gives you that tells you what your paper should be about). Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself “If a stranger were to read my paper over my shoulder, would it make sense?”

It might help you write academic essays once you know that all academic essays have qualities in common. Once you understand that, it is much easier to decide how to approach a paper assignment. Think of the graphic below as a “paper map.” The boxes represent paragraphs and the descriptions will tell you what the general goals are for each paragraph. Dotted lines represent the different parts of a paragraph. The “paper map” shows you the parts of an academic essay in the order they should appear in your paper. In other words, the thesis

statement should be at the end of the introductory paragraph. When you write an academic essay, you need to follow the "rules" of academic essay writing just like, when you play a sport, you need to follow the rules of the game.

Structure for an Academic Essay

Introduction Your introductory paragraph will have two main parts.	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs Each body paragraph will have three parts.	*Part 1: Topic Sentenc*e- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.
	Part 2: Evidence- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.
	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence is should be taken seriously.

Conclusion Your conclusion will have two parts.	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

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Good to Know . . .

Writing an academic paper requires you to make a series of choices . . . and sometimes there is more than one good choice!

When you are assigned an academic essay you have many choices to make. You have to decide on the best way to establish authority, the best evidence to include in your body paragraphs and the best way to write your evaluations for each paragraph.

Writing a paper is like getting to school. Let's say you live a mile and a half from school. Every day that you have class, you must get to school—preferably on time. But there are a number of kinds of transportation you might use to get there. You could walk, take the bus, drive your car, ride a bike or get a ride from someone else. You might even take the light rail and then walk. No matter what, you HAVE to get to school. However, you can choose the best option for you based on a number of factors such as how much time you have ("Whoops! 15 minutes? I guess I'll drive!"), the weather, ("What a lovely fall day! I think I'll walk.") how much you have to carry ("I have all my books for every class plus my lunch and my yoga mat—I think I'll drive.")

When you are assigned a paper, you HAVE to establish authority in your introductory paragraph, but you have to select the best strategy for doing so. You HAVE to present evidence and write and evaluation in your body paragraphs, but there may be more than way one to do so and write an effective paper.

Warm up for Writing

Before you actually begin to write your paper, there are three things to consider that will help you decide how to approach your paper.

1. What were you told to do? Make sure to carefully read the prompt you were given. Does it give you information about what the instructor wants? Often, the prompt your instructor gave you will directly tell you what he or she is looking for. For example, if a prompt says, “In your introductory paragraph, summarize Smith’s theory of education . . . .” then you know that you will use summary in your introduction.

2. What are your goals? If your goal is to explain how an experience you had in high school caused you to realize you want to become a physical therapist, then you need to use narrative to explain what happened to you.

3. What are your preferences? If the prompt does not provide you with information about what strategy to use, and several strategies might help you achieve your goal, then you can choose the goal that work best for you.

Working Out while Writing a Paper

The charts below describe the strategies you might use in three parts of your paper—the establishing authority part of the introduction, the evidence part of the body paragraph and the evaluation part of the body paragraph. Your job will be to select the strategies that are most likely to help you achieve your goal.

Strategies for Establishing Authority *Remember, the goal of establishing authority is to provide the reader with the information they need to understand your paper and prove to them that you are worth listening to. The following strategies will help you do that.*	
Summary	If you are responding to an essay, a video, a lecture or a book, you might choose to summarize its main ideas. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.

Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

The chart below lists different strategies you can choose from when you present evidence in your body paragraphs. Notice that many of the strategies are the same ones you can use to establish authority.

Strategies for Presenting Evidence *Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.*	
Summary	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.

Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.
Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

The chart below lists the strategies you can use when you evaluate your body paragraph. Remember, EACH body paragraph needs it's own evaluation. The strategies below are possible ways you can evaluate your paragraph.

Strategies for Evaluating Your Paragraph	
Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?

How is the information presented in the evidence part of the paragraph related?	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else changed as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the "Structure of an Academic Essay" graphic and go through your paper section by section. Do you establish authority? Do you have a thesis statement where it belongs? Do you have a topic sentence for each body paragraph? Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructor's expectations.

Eventually, your instructor will read your rough draft and provide comments for you. You will then have to revise. It is not uncommon for students to re-write papers five or six times before "getting it right." Be patient with the revision process!

Think about it . . .

Let's say you are taking a psychology class and you read an article about how veterans are returning home after military service and struggling to adjust to civilian life. Let's say your sister

is a returning soldier and you could relate to what the article said because your sister is experiencing the problems the article discusses. What establishing authority strategies do you think you could possibly use when you write this essay?

1. What was I told to do? Carefully read the prompt (the essay assignment) to make sure you understand what it is you are supposed to do. Sometimes, these prompts will make decisions for you.
2. What are my goals with this paper? Is your goal to compare and contrast two or more things? To cause your reader to feel sympathy for you or someone else? To describe a process? Your goals can help you decide what strategies you should use when you write your paper.
3. What are my preferences? Which strategies would you like to use to write your paper?

Academic Skill: Focus on Lecture

You will spend a great deal of time as a college student listening to lectures. Many instructors rely on lecture to give you information that is not in the book, while others will lecture right out of the book. To be a successful student, you need to have a system for taking notes on lectures and figuring out what your instructors goals are for his or her lectures.

Most lectures fall into one of three categories and it is good for you to think about what category the lectures from you courses fit:

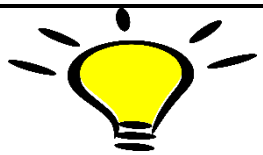
Hand-in-Hand lectures: These lectures are right over the material in the books. They are called hand-in-hand since they "walk" side by side with the book—what you read about in the books for the courses is the same material you are hearing about in lecture. Usually, your instructor will give "hand in hand" lectures because he or she believes the material in the book is either difficult and needs further explanation or because the information is REALLY important for you to learn and your instructor wants to do everything possible to make sure it makes sense to you.

Jumping off Point lectures: these lectures "jump off" from the book material. They bring in materials you cannot read about in the book—they may expand on ideas in the book or provide examples of concepts in the book. Usually, instructors who give "jumping off point" lectures believe that students can be responsible for reading the book and learning from it. Instead, they feel it is their job to use their expertise to provide you with information that you cannot learn from the book. They believe the information in the book is a foundation that their lectures will build from. They also believe you are responsible for the material they provide you in lecture and may well choose to test you on it.

Combination lectures: Some instructors will combine both Hand-in-hand and Jumping off point lectures. Others will use one type of lecture for some chapters in a semester and another type for other chapters.

A successful student warms up before a lecture, works out during a lecture and then cools down afterwards. Here is how this process applies to listening to lectures:

Activity	
Warm-up	To warm up your brain before a lecture, look over the notes you took in class the last time the class met. See if there are any clues about what today's lecture might be about. If not, make a guess based on what you are reading in class and previous lectures. Pay attention to whether previous lectures have been hand-in-hand, jumping-off-point or a combination of the two. Ask yourself why your instructor is choosing this type of lecture.
Work out	To work out in lectures is to take notes of some kind during it. Students have many different and effective ways to take notes. Over the course of this semester, you will develop one that works for you.
Cool Down	To cool down in lectures means to review your notes within 24 hours of taking them. Information from lectures is easy to forget, so the sooner you review them, the better.



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Good to Know . . .

Taking good notes on lectures is hard. Here is why . . .

It is a complex process. You have to listen to the lecture, figure out what is being said, decide what is important enough to write down, come up with a way to say it in your own words and write it down at the same time you are listening to the next ideas the lecturer is saying.

It is hard to catch everything. You cannot re-start, back up or re-read if you get confused. Lectures are like trains—they keep going whether you are on them or not. While you can certainly stop the lecturer to ask questions, it is sometimes difficult to do so.

Every lecture is different. If you have a great note taking style for one lecture, it might not be the best one for the next lecture. It can be a challenge to continually adapt your note taking style to fit the lecture.

Set Yourself Up for Success in Notetaking

In order to take effective notes, you have to understand the process of notetaking and then strategize to make it work for you.

Understanding the Process

Students are expected to take notes because it is impossible for the human brain to remember all of the important facts from a 50 – 80 minute lecture. Some students say "I get more out of lecture if I just sit and listen" but that is biologically impossible. The human brain is not wired to remember that much information at a sitting.

Think of lecture notes like a second (or third) "book" for the class. You are writing it based on your understanding of your instructor's lecture. You need to study it and use it just like you do your textbook and any other materials your instructor has assigned you to read. Many students take notes and don't' bother to review them until the day before a test— if you do this, you will likely not understand much of what you wrote. Notes need to be studied several times a week, just like you would with your book.

Warming up for Notetaking

In order to be a good notetaker, you need to have the right materials ready on the first day of class, and you need to have a way to organize and keep your notes.

- Get the right equipment: Notetaking is very low-tech. All you need is a notebook and a pen. Pencils tend to smear and fade so it is best not to use them. Have a separate notebook for each class. Do not take all your notes in one notebook—if you do, your math notes are jumbled up with your history notes and your English notes. Here are options for notetaking equipment:

Option	Advantages	Disadvantages
Buy a three or five subject notebook and devote a section of the notebook to each class.	Your notes are separated by subject, which makes it easier to review. You have only one notebook to keep track of.	If you use up an entire section of the notebook and need more paper, your notes will no longer be together. If you lose your notebook, you have lost all notes for all classes.

Buy separate notebooks for each class.	Your notes are separated by subject, and you can buy different color notebooks for each class. If you lose one notebook, at least you still have the others.	You will have more notebooks to keep track of and carry.
Buy loose-leaf paper and a three ring binder for each class.	Your notes are separated by subject, and you can buy different color binders. If you lose a binder you still have the others. You can re-arrange your notes if you need to, and you can 3-hole punch handouts and course materials to put in your binder with your notes. You can use binder for more than one semester.	Binders can be bulky. They are more expensive than notebooks. You have to remember to fill them with paper.

- Date your notes. Whatever notes you took on Wednesday, March 21, should be labelled big and bold across the top “Wednesday, march 21.” Dating your notes will make it much easier to find information when you need it later.

Working out During Notetaking

There are many ways to take effective notes. Some students love the Cornell method, other like to take simple narrative notes. Others like to use outlines or mind maps. Whatever method you choose, your notetaking system must have three features:

- It must allow you to clearly record main ideas from a lecture
- It must be “sustainable.” It is impossible to write down every word your instructor says. Therefore, you need to develop a method of taking notes that allows you to record a great deal of information quickly—this may involve developing a series of abbreviations, using symbols or creating an outline. Note taking strategies that require you to write out full sentences, spell all words correctly and record every idea are not sustainable because you will quickly fall behind.
- It must produce reviewable notes. The notes you take during a lecture are supposed to be like a second text book for your class. They are useless if you cannot use them to study for exams or do other assignments for the class. Your notes need to be legible, and have enough information that, when you go back, you can make sense of what you wrote.

Here are some general tips:

Abbreviate

Most classes have jargon you can abbreviate. In an American Government class, for example, the word “Government” will be used a great deal. In an Earth Science class, long words like “environment” or “Photosynthesis” might be used regularly. Abbreviate them—“gov,” “env” and “PhSyn” will be much easier for you to write quickly. If you are worried, you will forget what your abbreviations mean, make a glossary at the top of your page.

Abbreviate common concepts. For examples, instructor may say that something has increased or decreased, improved, or gotten worse etc. Use an arrow up or an arrow down to represent that idea. You can the arrow up or down in any class.

Use mathematical symbols to represent ideas like “added,” or “lost,” “divided” or “multiplied.” For example the concept:

“The Governor needed five more Congress members’ votes in order to pass the bill” might show up like this in your notes:

“Gov need 5 + cong member to pass bill.”

Pay Attention to Numbers

Listen for Phrases that Help You Set Goals

Most instructors provide some direction for students about what they will cover in a lecture. Often this happens at the beginning of class (So make sure you arrive at class on time, notebook and pen ready!)

Listen for phrases like:

> “Today we are going to talk about . . . “
>
> “We are going to discuss the reasons why _____ happened.”
>
> “There are five kind of . . . .”
>
> “It is important for you to understand . . . “
>
> “_____ is significant because . . . .”

Phrases like this help you understand what the goal of a lecture is. If your instructor says “The Civil Rights Movement had five significant effects on public policy” that means you need to end class knowing those five effects—you can make sure your notes reflect that.

Listen for Transitions

Most instructors give you some warning when they are about to move on to another topic. Learn to pay attention to how your instructors transition. Here are some clues:

Some will stop a lecture and ask if there are questions about what he/she just said. Often, that is a cue that he/she is moving on to another topic.

Others will cue the class by saying something like “The second important point . . . .” This tells you that the instructor is moving on. In your notes, write “2nd important point . . .”

Sometimes instructors will “change gears” by warming you that something is different than something else. For example, is a Biology teacher is talking about deciduous trees and wants to shift to talking about evergreen trees, she might say something like, “Evergreen trees are different from deciduous trees in several important ways . . . .” In your notes, write something like “Evergreen diff from decid trees ‘cuz .. . .”

Instructors will sometimes write lecture outlines on the board—make sure to use them! However, many students make the mistake of writing down only what the instructor puts on the board. Usually, this simply isn’t enough. Taking more through notes is necessary.

Cooling Down After the Lecture

The notes you take are like another book for your class. You need to use them like you would a book to study for your class, which mean that your notes have to have some of the same qualities a book does. Here are some ways to organize your notes:

- Create an “index.” After the lecture is over, jot down a few words about the subject of that day’s notes. Put it under the date that you put across the top of the page. Something like “Reasons the Civil War Started” will be fine. When you review notes later, you can scan the subjects to find the notes you need.

- As you know, textbooks often have important terms bolded. You can do the same thing. Use a highlighter to mark important terms. Make sure your notes have a definition of the term that makes sense to you. If they don’t add to the definition by drawing an arrow and writing in the margin.

- As you also know, textbooks often use bullet lists, headings and subheadings. Use a different colored pen and/or highlighters to go back to your notes and make your own headings and subheadings. For example, if you instructor is lecturing over the five major outcomes of the Civil Rights movement, go back to your notes and write (in the margins if you have to) “Five major outcomes of Civil Rights Movement.” Next, number each

reason so you can clearly see them. If you seem to be short a reason or two, visit your instructor or talk to classmate to see what you missed.

- Tab your notes. As you get closer to a big exam or paper, make tabs for your notes. You can buy tabs at office supply stores or make your own out of tape and colored paper. The tabs will run alongside the edge of the notes and will divide your notes up by subject. If you are taking an American History class, one tab might say “Revolutionary War.” Another might say “Civil War” etc.

Having well-organized notes is a great start, but it isn’t quite enough. After you organize your notes, you need to review them. Here are some ways to review your notes:

- Ask yourself why your instructor decided to lecture over this material in the way that he or she chose to do. What type of lecture is it? Hand-in-Hand or Jumping-off-point? Why do you suppose he or she chose to deliver that type of lecture to the class today? How does the lecture relate to other course materials you have to read for the course?

- Make sure you understood the lecture itself. When you review, pretend you need to tell a classmate who missed the lecture what the main ideas were. Actually explain the notes—either out loud or silently.

- Add additional notes of explanation you didn’t get a chance to add in class. Make sure you understand any abbreviations you might have used.

- Identify concepts that were not clear to you. Mark confusing parts up with questions marks and find a classmate, a tutor, or your instructor to get the concepts clarified.

- Share notes with a classmate. What did he or she write down? How is it different from what you wrote down? What can you add to one another’s notes?

Think about It . . . .

If you are in a sociology class and your instructor says “There are three theories about income inequality,” how could you set up your notes?

Think about jargon from one of your classes. How might you abbreviate terms your instructor says over and over?

Think about how your instructor uses lectures. Are they hand-in-hand? Jumping-Off-Point? Why do you suppose he or she does lectures this way?

Academic Skill: Focus on Discussions

Discussion is a big part of college instruction. Most instructors use discussion in their class at least a few times during the semester, so it is important to understand the purpose of college discussions. Many students have a negative opinion about discussion because they believe important information and learning can only come from the instructor, so what students have to say isn't really that important. Some students even get mad when their class has discussions—they believe that instructors have discussions when they want a "day off" and make the students do the work. Since an instructor's attention cannot be everywhere, some students use discussion time as an opportunity to text their friends and family, have side conversations or do homework for another class. They also believe that, since their classmates are not experts, what difference does it make what they have to say? However, your instructor has discussions for specific purposes. There are three types of discussions. They are:

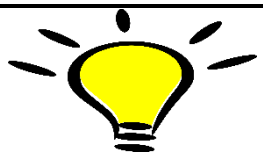
Concept Check Discussion- The purpose of concept check discussions is to give students opportunities to practice discussing challenging concepts. The act of putting unfamiliar terms and concepts into your own words causes you to clarify your thinking and deepen your understanding. Listening to someone else describe a concept is less likely to lead to deep understanding than having to talk about it yourself. Think about it like this— If you want to learn to swim, you must actually swim. You can learn a little bit by listening to someone talk about swimming, or watching other people swim, but you really cannot learn to swim until you put on a bathing suit and jump in the water.

Task Focused Discussion—The purpose of a task focused discussion is to complete a task—usually one that will help you with an upcoming test or assignment. Sometimes, task focused discussion are with the whole class, but sometimes the instructor will break the class up into small groups. An instructor might ask you to brainstorm topics for an upcoming paper, or think up examples to illustrate an important concept. He or she might ask you to summarize a reading, pick out main ideas or develop a time-line that will help you understand an important process or a significant series of events. In a math or science class, you might be asked to solve a mathematical problem.

Evaluation Discussion- An evaluation discussion focuses on evaluating another student's work. Students are often particularly hostile to evaluation discussion because they feel they are grading one another's work—which is the instructor's job, not theirs. They may think, "I barely understand this myself, why should I have to comment on someone else's work?" They may say

“Only the instructor’s opinion matters since that is where my grade comes from. Who cares what my classmates, who are as clueless as me, think?” However, your instructor sees evaluation discussions very differently. You may be asked to read and comment on one another’s essays, or you may be asked to compare and contrast how you approached a specific problem or question. Usually, the purpose of an evaluation discussion is to help students develop judgment about what is and is not effective work. Usually, this mean applying ideas you have learned in the class about effective writing, problem solving, etc. to that students works. For example, if you are learning about effective thesis statements, your instructor may want to see if you can read other students’ papers and recognize when a thesis statement is effective and when it needs more work. The idea behind an evaluation discussion is that, if you can recognize what is good and what needs word about a classmate’s thesis, you will leave class better able to write a good thesis statement of your own. Also, when you leave the class, you will have to actually use whatever you learned in the class on your own—for example, when you complete your composition class, you are expected to write an academic essay on your own. Evaluation discussion provide you will practice being independent and using your new skills while your instructor is still nearby to help you if you get confused.

	Activity
Warm-up	Warming up for a discussion can be difficult because you may not know you will have one until you arrive in class. If you do know—because your instructor has said something like, “Tomorrow we will discuss chapter 5” or “Bring your essays to class tomorrow and we are going to talk about them” then prepare by making sure your homework and readings are done as thoroughly as possible. In your notebook, jot down what you would like to get out of the discussion. For example, if you know you will be discussing a particular type of math problem, jot down what confuses you about it. You can also prepare questions ahead of time.
Work out	To work out in a discussion is to fully participate in the discussion by devoting you full energy into understanding and doing what your instructor is asking of you. It also means listening carefully to classmates and committing to the idea of saying something yourself.
Cool Down	To cool down after a discussion is to simply think carefully about which of the three purposes (or which combination of purposes) your discussion served. Ask yourself “What was I supposed to get out of this discussion?” Answering that question will help you determine what you instructor thinks is important.



Good to Know . . .

"Smart" Students are Likely Just Better Prepared . . .

Many students hesitate to say anything during discussion because they are convinced that everyone else in the class knows more than they do. Of course, some of the students in the class do know more than others.

However, remember that none of the students are experts—if they were, they wouldn't need to take the class at all. Instead, the "smart" students are likely the ones who carefully read, thought ahead of time about questions and come prepared to fully participate in discussion. They are not smarter than other students—they are simply better prepared.

Set Yourself Up for Success in Discussion

You have probably heard the saying "You get out of it what you put into it." This is true to discussions. You need to participate in discussions to get anything out of them. Discussions take the same kind of preparation that lectures do.

Warming Up for Discussion

In order to get the most out of a discussion make sure you read all materials and do all assignments ahead of time.

Sometimes, there is miscommunication between instructors and students that leads students the come to class unprepared. For example, your instructor might say something like, "On Friday, we will discuss chapter five." In most cases, your instructor assumes you will have read chapter five by the time you come to class. As a matter of fact, they will usually base their discussion on the assumption that everyone has read the chapter, so they will assume you are familiar with the terms and ideas introduced in the reading. Students sometimes assume that they will be told what they need to know about chapter five during class on Friday, so reading the chapter ahead of time isn't necessary. When students come to class without having read, they get confused quickly since the other students and the instructor are discussing terms and ideas they have not heard.

Similarly, an instructor might say something like “On Monday, we will have a workshop over your papers” or “We will go over the problems at the end of chapter three.” Most instructors expect you to come to class with your papers written and your problems completed to the best of your ability. What they hope to accomplish during class time is to have you ask questions about what you did not understand or to review other students’ work so you can comment on what they did well and what they need to work on. These activities are impossible if you haven’t done your homework ahead of time. However, sometimes students expect the class will be like a study hall where they can begin an assignment, or simply work on it on their own. In college study-hall like classes are fairly rare—since classes only meet two or three times a week, instructors generally expect you to actually do your homework outside class, while class time is usually spent either getting you ready to do homework and papers, getting you ready for exams or helping you evaluate work you have already done.

When the instructor expects students to peer review a paper they have not written or to discuss a chapter they have not read, this leads students to believe that these class days are simply a waste of time and that their instructor is boring. The truth is that the activity is a waste of time because the student is not prepared for the discussion. If a hockey player showed up for practice with no skates or pads, he or she would have to sit on the bench and watch everyone else practice. Practice will go on without him or her with the players that did show up prepared. This doesn’t mean the practice itself is a waste of time or ineffective. It means that it was a waste of time for the player who did not show up prepared. The same is true for your classes—if you show up prepared, you will get more out of class.

Working Out During a Discussion

At the beginning of a discussion, see if you can figure out if the discussion is *concept check discussion*, a *task focused discussion* or an *evaluation discussion*. How you “work out” during each one will differ.

Working out for a Concept Check Discussion

Your instructor has concept check discussion because he or she wants to give you practice talking about important ideas. That means one of two things:

1. Your instructor believes the material you are covering is essential to the class and you will benefit from an opportunity to ask questions and discuss ideas with others. His or her goal is that you will leave class with a good understanding of whatever was the subject of the discussion. He or she wants you to have this solid understanding because he or she knows it will be important later—the concepts you cover in that discussion will be essential to understanding the rest of the class.

2. Your instructor wants you to be able to discuss certain ideas in your own words, or develop your own opinion about some part of the subject matter. Your instructor rarely does this randomly—he or she wants you to be able to discuss certain ideas in your own words or develop your own opinion about certain ideas in order to prepare you for something you will do down the road such as write a paper, take an essay test or give a speech.

To get the most out of a Concept Check discussion, ask yourself: "What concepts and ideas seem to be really important to my instructor in this discussion? How confident am I that I understand these concepts? Do I understand this concept well enough to discuss it in my own words? Have I developed my own opinions about this concept?"

Finally, find out what you have to do with the information you are learning. Will you have to write a paper? Take an essay test? Give a speech? You can often look at a course schedule or the syllabus to find out. If you can't find anything there, ask your instructor directly what assignments are coming up and how the discussion you are currently doing relates to that assignment.

Working Out for a Task Focused Discussion

Your instructor has Task focused discussions when he or she wants to give you an opportunity to master a skill you will need to be successful in the class or give you an opportunity to accomplish a task that will have a direct influence on an assignment you will need to do later. Often task focused discussion happen in small groups of 3 to 5.

To work out during a task focused discussion, ask yourself, "Why is this skill important to master?" or "How will this task we are working on help me with the assignment, tests, etc we will have down the road?"

Also, actually participate during the discussion. It is tempting to allow the other students to do the work, particular if it seems they know more than you do. However, if it matters to your success in the class that you master particular skills, ask yourself, "Do I really understand this?" Make every effort to truly understand the task you are being asked to do. Make every effort to understand why your instructor would like you to do that task and how it relates to upcoming assignments, papers or tests.

Working Out During an Evaluation Discussion

Your instructor has an evaluation discussion when he or she wants you to provide feedback to other students in the class on something they have done—like a paper or an art project. Of course, you should also receive feedback from other students. Your instructor has these kinds of discussions because he or she wants to give you opportunities to practice skills you have learned in the class so you will slowly but surely be able to do these things on your own. The

question to ask yourself during an Evaluation discussion is, “Have a mastered these skills I am learning well enough to be able to apply them to my own work and the work of other students?”

Cooling Down After a Discussion

A cool down for a discussion is fairly straightforward. When you are doing your homework for the class later on, ask yourself these questions:

“What did my instructor want us to get out of today’s discussion?” Jot down all the answers you could think of. You might say “My instructor wants us to learn how supply-demand graphs work” or “My instructor wanted to know how well we understood cell division.”

Next ask yourself, “How will the concepts I learned in this discussion help me achieve future goals in the class?” Again, jot down your answers. You might say “My instructor wants us to learn how supply-demand graphs work because we will have to do them on the exam in two weeks.”

Finally, ask yourself how confident you are that you understand not only why you had this sort of discussion, but if you mastered the skills or concepts you were working with.

Think about It

You arrive at class one day and your instructor wants the class to debate whether presidential elections should be determine by the popular vote or the electoral college. What type of discussion is this? What sorts of assignments would an assignment like this prepare you to do?

Your math instructor tells you that, the next time the class meets, you will work in groups to solve a series of problems. You have to write out each step your group took to solve the problem on a sheet of poster paper and then explain to the rest of the class why you chose to solve the problem like you did. What kind of lecture is this? What does a discussion like this prepare you to do?

Chapter 2: Stress

Academic Skill: Reading

This chapter features a chapter, lecture and a reading on Stress— this chapter will enable you to practice all the academic skills you have been learning in this book. As you read this chapter, consider that you have two major tasks you need to do once it is complete.

1. You will need to take a multiple-choice test on the material in the chapter.
2. Write a paper in which you compare and contrast how the chapter discusses stress with the way the lecture does.

Now that you this, you will need to make a plan for reading the chapter. Your plan needs to consider that you will need to take a multiple-choice test once you are done with the chapter, but you will also have to write a paper.

Your plan also needs to consider the

- Structure of the chapter
- Your personal preferences for taking notes.

Warm Up

Here are the steps you need to take to decide on a pre-reading strategy:

1) Page through the chapter and read headings. Look at the pictures, graphs and charts. Read the Review questions that are interspersed throughout the chapter. In the space below, write down important ideas you expect to learn in this chapter.

2) Now that you have a good sense of what this chapter will be about, select a pre-reading strategy that you think will prepare you for a multiple choice exam. Remember, you can

adapt pre-reading strategies or combine them to come up with the best strategy for your needs. Below are the pre-reading strategies you can select from.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There questions about studying in a group if you join a study or tutor group. **Chapter Information** The test over this material is on _____. How many pages will I have to read each day to complete the reading before the test? _____ How many sections are there in this chapter? _____ **Group Information (If you're meeting in a group.)** This group will meet again on _____. By then, I will need to read ___ pages and ___ sections. **Time Management** *Date_____ Time I began reading_____ Time I ended_____ # of pages completed_____ *Use this information to calculate how long it will take you to complete the chapter so you can make an accurate schedule.

Pre-Reading Strategy 2: The Foundation Builder	Lay a good foundation for your reading by examine the headings, the subheadings, and the graphs in the entire chapter. Headings tell you what the chapter will be about, which prepares your mind and helps you read more efficiently. Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer	It is important to know where you've been before you move on to somewhere new. You have about 24 hours to review information you learned when you study before you forget it forever. Here is a technique for reviewing book notes: Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Which of these three strategies seems to be the most appropriate? Will you use it as is? Would you like to adapt the strategy? If so, how? Write your pre-reading plan below:

Notice how many sections are in this chapter. To be effective, your pre-reading notes need to be clearly organized so when you go back and read them, it is clear which section of the chapter they are from.

Work Out

Once you have completed your warm-up, now it is time to decide on a work-out. Again, you can select more than one strategy if you would like to do so. You can also select one strategy you use in part of the chapter, but you can change your mind and use a different one in other parts of the chapter if it makes more sense. As the structure and the goals of the chapter change, you might like to change your notetaking strategy, just like a coach would change a game plan if the other team did something unexpected.

Below, write down which strategies you think you are most likely to use as your read. Why did you select the strategies that you did? Do you think you might adapt them?

Strategy 1: **Connector**	As you read new sections of your textbook or book you need to relate the new information you are learning to what you have already read.

	How does this section fit into the book? How does this section connect to the previous section? Introduces a topic that: Supports the big main idea Describes another step in a process you are learning Describes events in the order in which they occur Other:_____ How does section this relate to the lecture? Does the lecture expand on ideas brought up in the book? Does the lecture cover different materials altogether? Does the lecture go over the book directly?

Strategy 2: **Illustrator**	Your job is to use pictures or graphs to represent the ideas in this section of your textbook. It is best if the graphic you pick will help you see the relationships between the different ideas you must learn. Are you learning about a process or are you learning about events as they happened? Make a timeline. Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3: **Note taker**	In this class, you will learn a variety of notetaking strategies. They might include matrix notes, graphic organizers, Cornell notes, outline style and others. If you feel that one of these note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section. Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

Reading: Stress Introduction

(Bibliography for this chapter is located in Appendix A)

Exams are a stressful, but unavoidable, element of college life. (credit "left": modification of work by Travis K. Mendoza; credit "center": modification of work by "albertogp123"/Flickr; credit "right": modification of work by Jeffrey Pioquinto, SJ)

Few would deny that today's college students are under a lot of pressure. In addition to many usual stresses and strains incidental to the college experience (e.g., exams, term papers, and the dreaded freshman 15), students today are faced with increased college tuitions, burdensome debt, and difficulty finding employment after graduation. A significant population of non-traditional college students may face additional stressors, such as raising children or holding down a full-time job while working toward a degree.

Of course, life is filled with many additional challenges beyond those incurred in college or the workplace. We might have concerns with financial security, difficulties with friends or neighbors, family responsibilities, and we may not have enough time to do the things we want to do. Even minor hassles—losing things, traffic jams, and loss of internet service—all involve pressure and demands that can make life seem like a struggle and that can compromise our sense of well-being. That is, all can be stressful in some way.

Scientific interest in stress, including how we adapt and cope, has been longstanding in psychology; indeed, after nearly a century of research on the topic, much has been learned and many insights have been developed. This chapter examines stress and highlights our current understanding of the phenomenon, including its psychological and physiological natures, its causes and consequences, and the steps we can take to master stress rather than become its victim.

14.1 What Is Stress?

Page by: OpenStax

The term stress as it relates to the human condition first emerged in scientific literature in the 1930s, but it did not enter the popular vernacular until the 1970s (Lyon, 2012). Today, we often use the term loosely in describing a variety of unpleasant feeling states; for example, we often say we are stressed out when we feel frustrated, angry, conflicted, overwhelmed, or fatigued. Despite the widespread use of the term, stress is a fairly vague concept that is difficult to define with precision.

Researchers have had a difficult time agreeing on an acceptable definition of stress. Some have conceptualized stress as a demanding or threatening event or situation (e.g., a high-stress job, overcrowding, and long commutes to work). Such conceptualizations are known as stimulus-based definitions because they characterize stress as a stimulus that causes certain reactions. Stimulus-based definitions of stress are problematic, however, because they fail to recognize that people differ in how they view and react to challenging life events and situations. For example, a conscientious student who has studied diligently all semester would likely experience less stress during final exams week than would a less responsible, unprepared student.

Others have conceptualized stress in ways that emphasize the physiological responses that occur when faced with demanding or threatening situations (e.g., increased arousal). These conceptualizations are referred to as response-based definitions because they describe stress as a response to environmental conditions. For example, the endocrinologist Hans Selye, a famous stress researcher, once defined stress as the "response of the body to any demand, whether it is caused by, or results in, pleasant or unpleasant conditions" (Selye, 1976, p. 74). Selye's definition of stress is response-based in that it conceptualizes stress chiefly in terms of the body's physiological reaction to any demand that is placed on it. Neither stimulus-based nor response-based definitions provide a complete definition of stress. Many of the physiological reactions that occur when faced with demanding situations (e.g., accelerated heart rate) can also occur in response to things that most people would not consider to be genuinely stressful, such as receiving unanticipated good news: an unexpected promotion or raise.

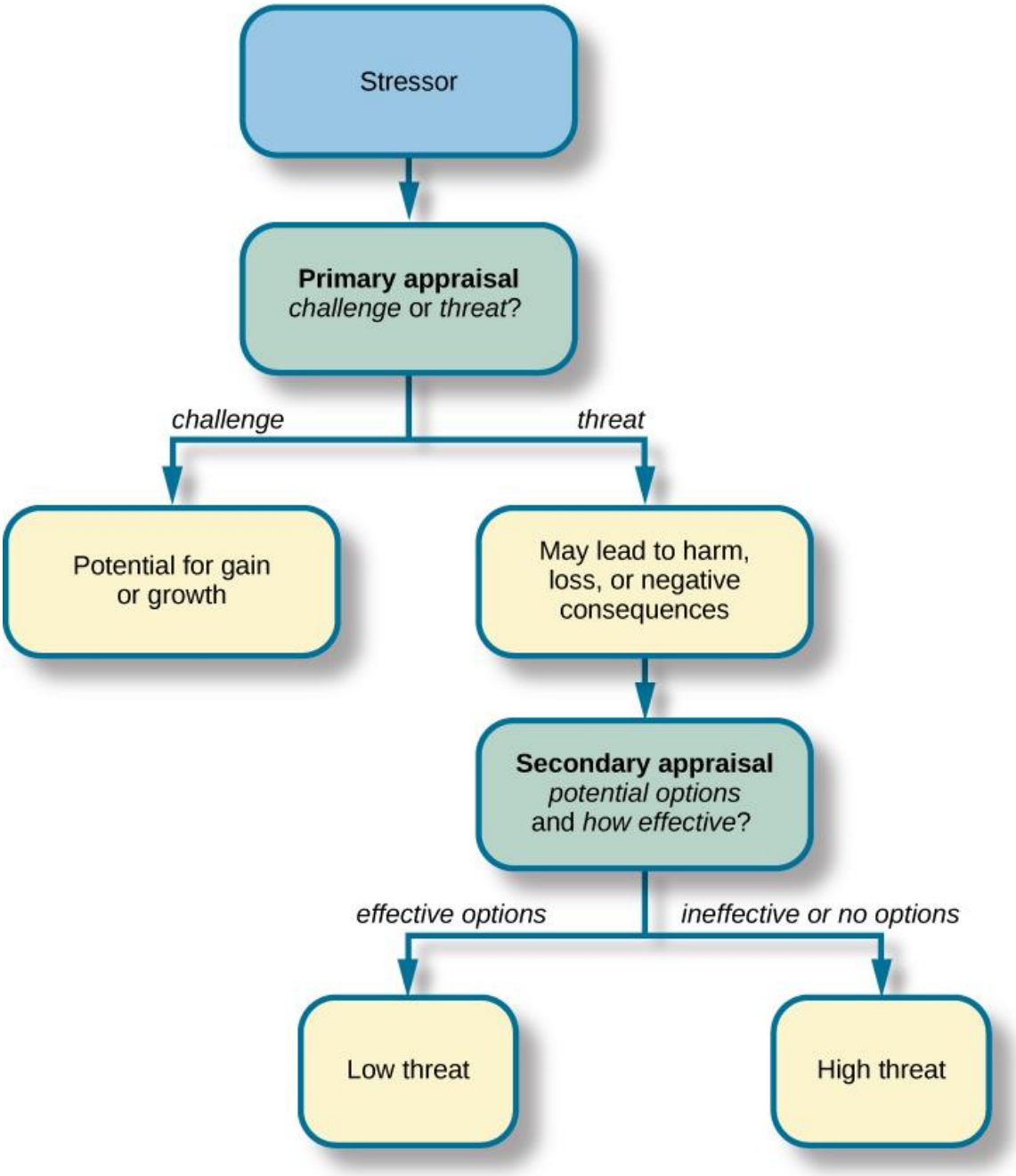
A useful way to conceptualize stress is to view it as a process whereby an individual perceives and responds to events that he appraises as overwhelming or threatening to his well-being (Lazarus & Folkman, 1984). A critical element of this definition is that it emphasizes the importance of how we appraise—that is, judge—demanding or threatening events (often referred to as stressors); these appraisals, in turn, influence our reactions to such events. Two kinds of appraisals of a stressor are especially important in this regard: primary and secondary appraisals. A primary appraisal involves judgment about the degree of potential harm or threat to well-being that a stressor might entail. A stressor would likely be appraised as a threat if one anticipates that it could lead to some kind of harm, loss, or other negative consequence; conversely, a stressor

would likely be appraised as a challenge if one believes that it carries the potential for gain or personal growth. For example, an employee who is promoted to a leadership position would likely perceive the promotion as a much greater threat if she believed the promotion would lead to excessive work demands than if she viewed it as an opportunity to gain new skills and grow professionally. Similarly, a college student on the cusp of graduation may face the change as a threat or a challenge (Figure).

Graduating from college and entering the workforce can be viewed as either a threat (loss of financial support) or a challenge (opportunity for independence and growth). (credit: Timothy Zanker)

The perception of a threat triggers a secondary appraisal: judgment of the options available to cope with a stressor, as well as perceptions of how effective such options will be (Lyon, 2012) (Figure). As you may recall from what you learned about self-efficacy, an individual's belief in his ability to complete a task is important (Bandura, 1994). A threat tends to be viewed as less catastrophic if one believes something can be done about it (Lazarus & Folkman, 1984). Imagine that two middle-aged women, Robin and Maria, perform breast self-examinations one morning and each woman notices a lump on the lower region of her left breast. Although both women view the breast lump as a potential threat (primary appraisal), their secondary appraisals differ considerably. In considering the breast lump, some of the thoughts racing through Robin's mind are, "Oh my God, I could have breast cancer! What if the cancer has spread to the rest of my body and I cannot recover? What if I have to go through chemotherapy? I've heard that experience is awful! What if I have to quit my job? My husband and I won't have enough money to pay the mortgage. Oh, this is just horrible…I can't deal with it!" On the other hand, Maria thinks, "Hmm, this may not be good. Although most times these things turn out to be benign, I need to have it checked out. If it turns out to be breast cancer, there are doctors who can take care of it because the medical technology today is quite advanced. I'll have a lot of different options, and I'll be just fine." Clearly, Robin and Maria have different outlooks on what might turn out to be a very serious situation: Robin seems to think that little could be done about it, whereas Maria believes that, worst case scenario, a number of options that are likely to

be effective would be available. As such, Robin would clearly experience greater stress than would Maria.



When encountering a stressor, a person judges its potential threat (primary appraisal) and then determines if effective options are available to manage the situation. Stress is likely to result if a stressor is perceived as extremely threatening or threatening with few or no effective coping options available.

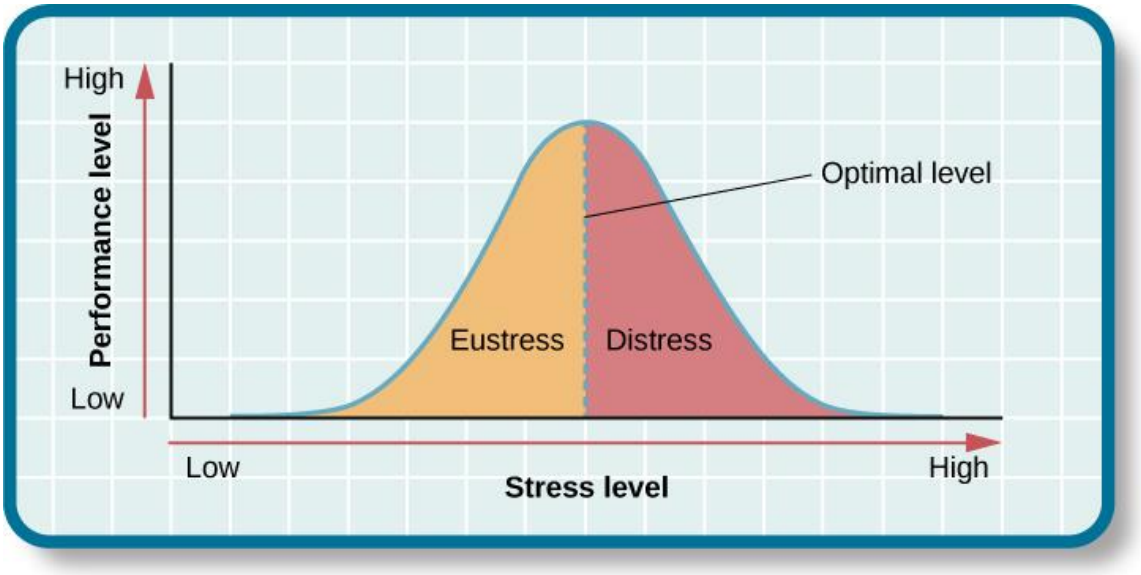
To be sure, some stressors are inherently more stressful than others in that they are more threatening and leave less potential for variation in cognitive appraisals (e.g., objective threats to one's health or safety). Nevertheless, appraisal will still play a role in augmenting or diminishing our reactions to such events (Everly & Lating, 2002).

If a person appraises an event as harmful and believes that the demands imposed by the event exceed the available resources to manage or adapt to it, the person will subjectively experience a state of stress. In contrast, if one does not appraise the same event as harmful or threatening, she is unlikely to experience stress. According to this definition, environmental events trigger stress reactions by the way they are interpreted and the meanings they are assigned. In short, stress is largely in the eye of the beholder: it's not so much what happens to you as it is how you respond (Selye, 1976).

Good Stress?

Although stress carries a negative connotation, at times it may be of some benefit. Stress can motivate us to do things in our best interests, such as study for exams, visit the doctor regularly, exercise, and perform to the best of our ability at work. Indeed, Selye (1974) pointed out that not all stress is harmful. He argued that stress can sometimes be a positive, motivating force that can improve the quality of our lives. This kind of stress, which Selye called eustress (from the Greek *eu* = "good"), is a good kind of stress associated with positive feelings, optimal health, and performance. A moderate amount of stress can be beneficial in challenging situations. For example, athletes may be motivated and energized by pregame stress, and students may experience similar beneficial stress before a major exam. Indeed, research shows that moderate stress can enhance both immediate and delayed recall of educational material. Male participants in one study who memorized a scientific text passage showed improved memory of the passage immediately after exposure to a mild stressor as well as one day following exposure to the stressor (Hupbach & Fieman, 2012).

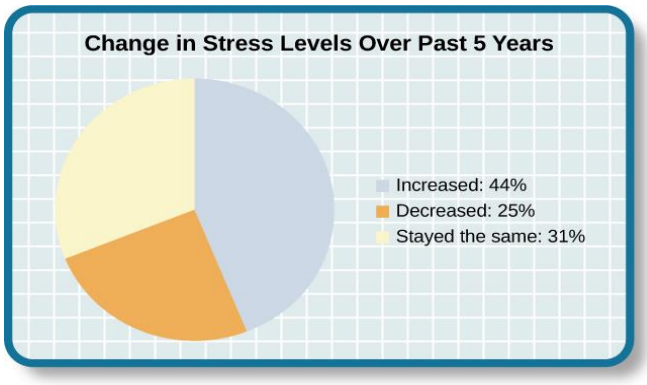
Increasing one's level of stress will cause performance to change in a predictable way. As shown in Figure, as stress increases, so do performance and general well-being (eustress); when stress levels reach an optimal level (the highest point of the curve), performance reaches its peak. A person at this stress level is colloquially at the top of his game, meaning he feels fully energized, focused, and can work with minimal effort and maximum efficiency. But when stress exceeds this optimal level, it is no longer a positive force—it becomes excessive and debilitating, or what Selye termed distress (from the Latin *dis* = "bad"). People who reach this level of stress feel burned out; they are fatigued, exhausted, and their performance begins to decline. If the stress remains excessive, health may begin to erode as well (Everly & Lating, 2002).



As the stress level increases from low to moderate, so does performance (eustress). At the optimal level (the peak of the curve), performance has reached its peak. If stress exceeds the optimal level, it will reach the distress region, where it will become excessive and debilitating, and performance will decline (Everly & Lating, 2002).

The Prevalence of Stress

Stress is everywhere and, as shown in Figure, it has been on the rise over the last several years. Each of us is acquainted with stress—some are more familiar than others. In many ways, stress feels like a load you just can't carry—a feeling you experience when, for example, you have to drive somewhere in a crippling blizzard, when you wake up late the morning of an important job interview, when you run out of money before the next pay period, and before taking an important exam for which you realize you are not fully prepared.



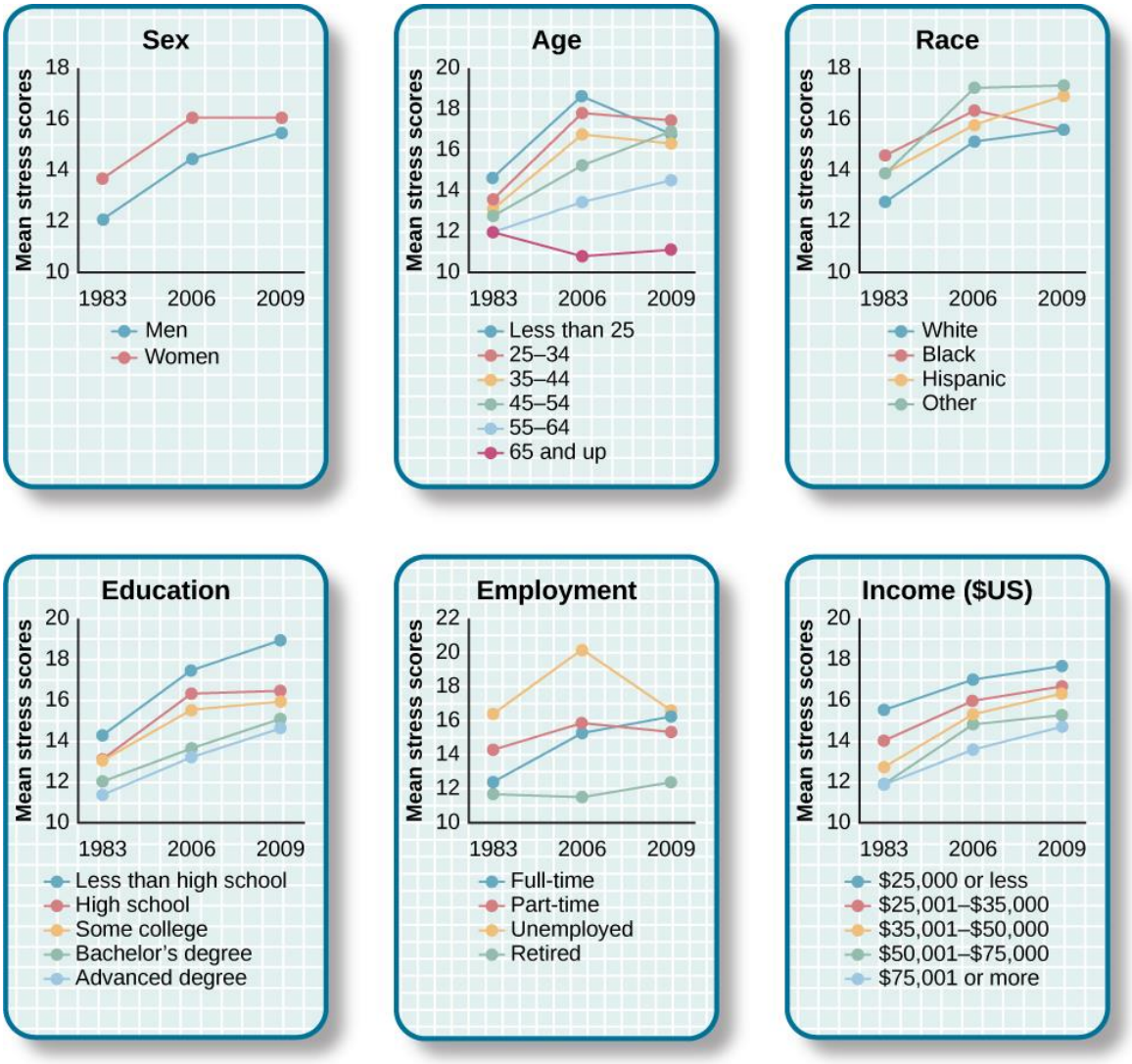
Nearly half of U.S. adults indicated that their stress levels have increased over the last five years (Neelakantan, 2013).

Stress is an experience that evokes a variety of responses, including those that are physiological (e.g., accelerated heart rate, headaches, or gastrointestinal problems), cognitive (e.g., difficulty concentrating or making decisions), and behavioral (e.g., drinking alcohol, smoking, or taking actions directed at eliminating the cause of the stress). Although stress can be positive at times, it can have deleterious health implications, contributing to the onset and progression of a variety of physical illnesses and diseases (Cohen & Herbert, 1996).

The scientific study of how stress and other psychological factors impact health falls within the realm of health psychology, a subfield of psychology devoted to understanding the importance of psychological influences on health, illness, and how people respond when they become ill (Taylor, 1999). Health psychology emerged as a discipline in the 1970s, a time during which there was increasing awareness of the role behavioral and lifestyle factors play in the development of illnesses and diseases (Straub, 2007). In addition to studying the connection between stress and illness, health psychologists investigate issues such as why people make certain lifestyle choices (e.g., smoking or eating unhealthy food despite knowing the potential adverse health implications of such behaviors). Health psychologists also design and investigate the effectiveness of interventions aimed at changing unhealthy behaviors. Perhaps one of the more fundamental tasks of health psychologists is to identify which groups of people are especially at risk for negative health outcomes, based on psychological or behavioral factors.

For example, measuring differences in stress levels among demographic groups and how these levels change over time can help identify populations who may have an increased risk for illness or disease.

Figure depicts the results of three national surveys in which several thousand individuals from different demographic groups completed a brief stress questionnaire; the surveys were administered in 1983, 2006, and 2009 (Cohen & Janicki-Deverts, 2012). All three surveys demonstrated higher stress in women than in men. Unemployed individuals reported high levels of stress in all three surveys, as did those with less education and income; retired persons reported the lowest stress levels. However, from 2006 to 2009 the greatest increase in stress levels occurred among men, Whites, people aged 45–64, college graduates, and those with full-time employment. One interpretation of these findings is that concerns surrounding the 2008–2009 economic downturn (e.g., threat of or actual job loss and substantial loss of retirement savings) may have been especially stressful to White, college-educated, employed men with limited time remaining in their working careers.



The charts above, adapted from Cohen & Janicki-Deverts (2012), depict the mean stress level scores among different demographic groups during the years 1983, 2006, and 2009. Across categories of sex, age, race, education level, employment status, and income, stress levels generally show a marked increase over this quarter-century time span.

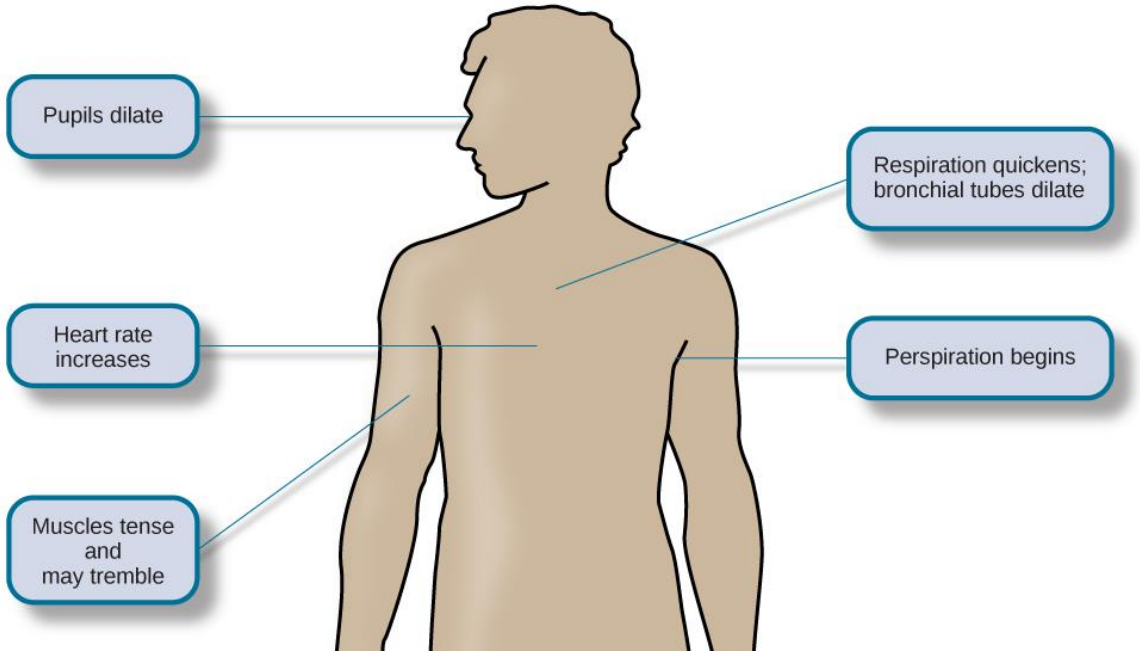
Early Contributions to the Study of Stress

As previously stated, scientific interest in stress goes back nearly a century. One of the early pioneers in the study of stress was Walter Cannon, an eminent American physiologist at Harvard Medical School (Figure). In the early part of the 20th century, Cannon was the first to identify the body's physiological reactions to stress.

Harvard physiologist Walter Cannon first articulated and named the fight-or-flight response, the nervous system's sympathetic response to a significant stressor.

Cannon and the Fight-or-Flight Response

Imagine that you are hiking in the beautiful mountains of Colorado on a warm and sunny spring day. At one point during your hike, a large, frightening-looking black bear appears from behind a stand of trees and sits about 50 yards from you. The bear notices you, sits up, and begins to lumber in your direction. In addition to thinking, "This is definitely not good," a constellation of physiological reactions begins to take place inside you. Prompted by a deluge of epinephrine (adrenaline) and norepinephrine (noradrenaline) from your adrenal glands, your pupils begin to dilate. Your heart starts to pound and speeds up, you begin to breathe heavily and perspire, you get butterflies in your stomach, and your muscles become tense, preparing you to take some kind of direct action. Cannon proposed that this reaction, which he called the fight-or-flight response, occurs when a person experiences very strong emotions—especially those associated with a perceived threat (Cannon, 1932). During the fight-or-flight response, the body is rapidly aroused by activation of both the sympathetic nervous system and the endocrine system (Figure). This arousal helps prepare the person to either fight or flee from a perceived threat.



Fight or flight is a physiological response to a stressor.

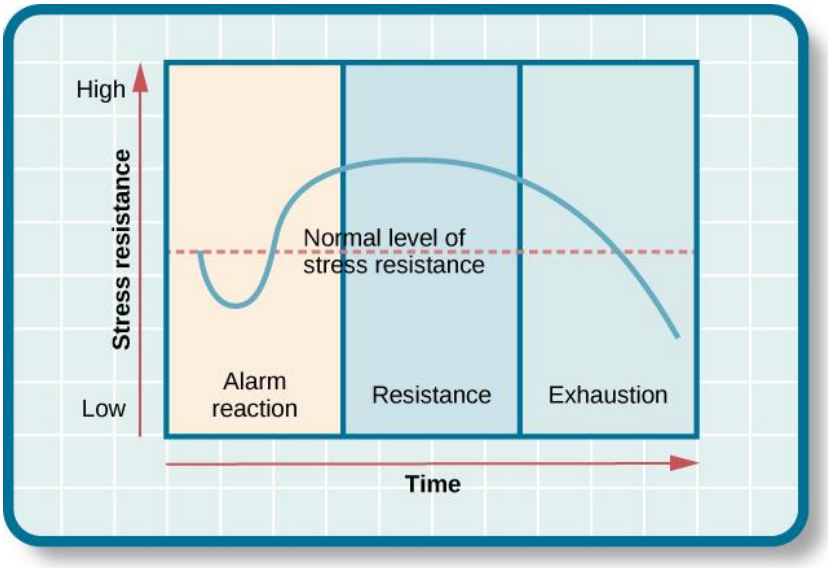
According to Cannon, the fight-or-flight response is a built-in mechanism that assists in maintaining homeostasis—an internal environment in which physiological variables such as blood pressure, respiration, digestion, and temperature are stabilized at levels optimal for survival. Thus, Cannon viewed the fight-or-flight response as adaptive because it enables us to adjust internally and externally to changes in our surroundings, which is helpful in species survival.

Selye and the General Adaptation Syndrome

Another important early contributor to the stress field was Hans Selye, mentioned earlier. He would eventually become one of the world's foremost experts in the study of stress (Figure). As a young assistant in the biochemistry department at McGill University in the 1930s, Selye was engaged in research involving sex hormones in rats. Although he was unable to find an answer for what he was initially researching, he incidentally discovered that when exposed to prolonged negative stimulation (stressors)—such as extreme cold, surgical injury, excessive muscular exercise, and shock—the rats showed signs of adrenal enlargement, thymus and lymph node shrinkage, and stomach ulceration. Selye realized that these responses were triggered by a coordinated series of physiological reactions that unfold over time during continued exposure to a stressor. These physiological reactions were nonspecific, which means that regardless of the type of stressor, the same pattern of reactions would occur. What Selye discovered was the general adaptation syndrome, the body's nonspecific physiological response to stress.

Hans Selye specialized in research about stress. In 2009, his native Hungary honored his work with this stamp, released in conjunction with the 2nd annual World Conference on Stress.

The general adaptation syndrome, shown in Figure, consists of three stages: (1) alarm reaction, (2) stage of resistance, and (3) stage of exhaustion (Selye, 1936; 1976). Alarm reaction describes the body's immediate reaction upon facing a threatening situation or emergency, and it is roughly analogous to the fight-or-flight response described by Cannon. During an alarm reaction, you are alerted to a stressor, and your body alarms you with a cascade of physiological reactions that provide you with the energy to manage the situation. A person who wakes up in the middle of the night to discover her house is on fire, for example, is experiencing an alarm reaction.



The three stages of Selye's general adaptation syndrome are shown in this graph. Prolonged stress ultimately results in exhaustion.

If exposure to a stressor is prolonged, the organism will enter the stage of resistance. During this stage, the initial shock of alarm reaction has worn off and the body has

adapted to the stressor. Nevertheless, the body also remains on alert and is prepared to respond as it did during the alarm reaction, although with less intensity. For example, suppose a child who went missing is still missing 72 hours later. Although the parents would obviously remain extremely disturbed, the magnitude of physiological reactions would likely have diminished over the 72 intervening hours due to some adaptation to this event.

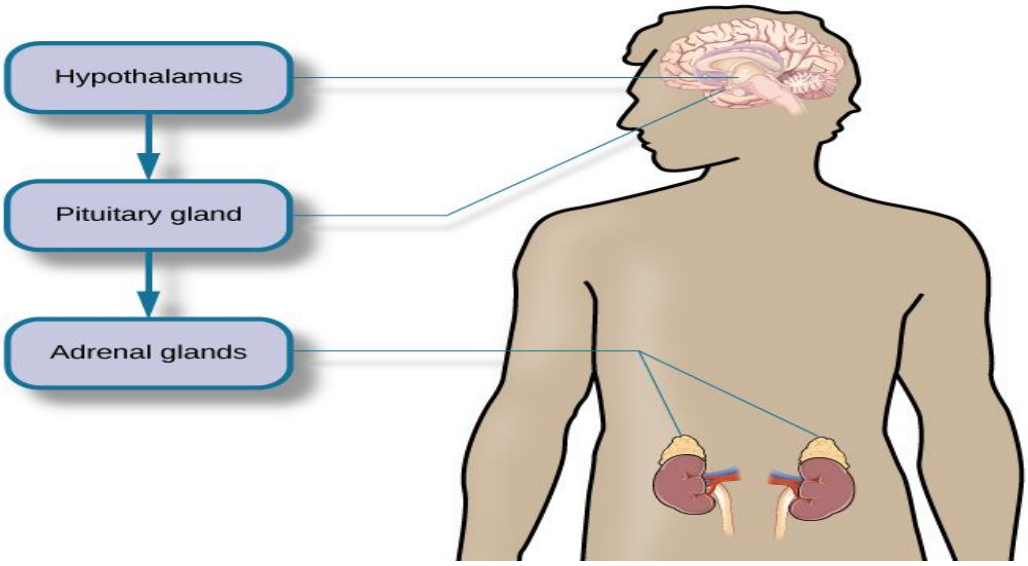
If exposure to a stressor continues over a longer period of time, the stage of exhaustion ensues. At this stage, the person is no longer able to adapt to the stressor: the body's ability to resist becomes depleted as physical wear takes its toll on the body's tissues and organs. As a result, illness, disease, and other permanent damage to the body—even death—may occur. If a missing child still remained missing after three months, the long-term stress associated with this situation may cause a parent to literally faint with exhaustion at some point or even to develop a serious and irreversible illness.

In short, Selye's general adaptation syndrome suggests that stressors tax the body via a three-phase process—an initial jolt, subsequent readjustment, and a later depletion of all physicalresources—that ultimately lays the groundwork for serious health problems and even death. It should be pointed out, however, that this model is a response-based conceptualization of stress, focusing exclusively on the body's physical responses while largely ignoring psychological factors such as appraisal and interpretation of threats. Nevertheless, Selye's model has had an enormous impact on the field of stress because it offers a general explanation for how stress can lead to physical damage and, thus, disease. As we shall discuss later, prolonged or repeated stress has been implicated in development of a number of disorders such as hypertension and coronary artery disease.

The Physiological Basis of Stress

What goes on inside our bodies when we experience stress? The physiological mechanisms of stress are extremely complex, but they generally involve the work of two systems—the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. When a person first perceives something as stressful (Selye's alarm reaction), the sympathetic nervous system triggers arousal via the release of adrenaline from the adrenal glands. Release of these hormones activates the fight-or-flight responses to stress, such as accelerated heart rate and respiration. At the same time, the HPA axis, which is primarily endocrine in nature, becomes especially active, although it works much more slowly than the sympathetic nervous system. In response to stress, the hypothalamus (one of the limbic structures in the brain) releases corticotrophin-releasing factor, a hormone that causes the pituitary gland to release adrenocorticotropic hormone (ACTH) (Figure). The ACTH then activates the adrenal glands to secrete a number of hormones into the bloodstream; an important one is cortisol, which can affect virtually every organ within the body. Cortisol is commonly known as a stress hormone and helps provide that boost of energy when we first

encounter a stressor, preparing us to run away or fight. However, sustained elevated levels of cortisol weaken the immune system.



This diagram shows the functioning of the hypothalamic-pituitary-adrenal (HPA) axis. The hypothalamus activates the pituitary gland, which in turn activates the adrenal glands, increasing their secretion of cortisol.

In short bursts, this process can have some favorable effects, such as providing extra energy, improving immune system functioning temporarily, and decreasing pain sensitivity. However, extended release of cortisol—as would happen with prolonged or chronic stress—often comes at a high price. High levels of cortisol have been shown to produce a number of harmful effects. For example, increases in cortisol can significantly weaken our immune system (Glaser & Kiecolt-Glaser, 2005), and high levels are frequently observed among depressed individuals (Geoffroy, Hertzman, Li, & Power, 2013). In summary, a stressful event causes a variety of physiological reactions that activate the adrenal glands, which in turn release epinephrine, norepinephrine, and cortisol. These hormones affect a number of bodily processes in ways that prepare the stressed person to take direct action, but also in ways that may heighten the potential for illness.

When stress is extreme or chronic, it can have profoundly negative consequences. For example, stress often contributes to the development of certain psychological disorders, including post-traumatic stress disorder, major depressive disorder, and other serious psychiatric conditions. Additionally, we noted earlier that stress is linked to the development and progression of a variety of physical illnesses and diseases. For example, researchers in one study found that people injured during the September 11, 2001, World Trade Center disaster or who developed post-traumatic stress symptoms afterward later suffered significantly elevated rates of heart disease (Jordan, Miller-Archie, Cone, Morabia, & Stellman, 2011). Another investigation yielded that self-reported stress symptoms among aging and retired Finnish food industry workers were associated with morbidity 11 years later. This study also predicted the onset of

musculoskeletal, nervous system, and endocrine and metabolic disorders (Salonen, Arola, Nygård, & Huhtala, 2008). Another study reported that male South Korean manufacturing employees who reported high levels of work-related stress were more likely to catch the common cold over the next several months than were those employees who reported lower work-related stress levels (Park et al., 2011). Later, you will explore the mechanisms through which stress can produce physical illness and disease.

Summary

Stress is a process whereby an individual perceives and responds to events appraised as overwhelming or threatening to one's well-being. The scientific study of how stress and emotional factors impact health and well-being is called health psychology, a field devoted to studying the general impact of psychological factors on health. The body's primary physiological response during stress, the fight-or-flight response, was first identified in the early 20th century by Walter Cannon. The fight-or-flight response involves the coordinated activity of both the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. Hans Selye, a noted endocrinologist, referred to these physiological reactions to stress as part of general adaptation syndrome, which occurs in three stages: alarm reaction (fight-or-flight reactions begin), resistance (the body begins to adapt to continuing stress), and exhaustion (adaptive energy is depleted, and stress begins to take a physical toll).

Review Questions

Negative effects of stress are most likely to be experienced when an event is perceived as _____.

a. negative, but it is likely to affect one's friends rather than oneself
b. challenging
c. confusing
d. threatening, and no clear options for dealing with it are apparent

Between 2006 and 2009, the greatest increases in stress levels were found to occur among _____.

a. Blacks
b. those aged 45–64
c. the unemployed
d. those without college degrees

At which stage of Selye's general adaptation syndrome is a person especially vulnerable to illness?

a. exhaustion
b. alarm reaction
c. fight-or-flight
d. resistance

During an encounter judged as stressful, cortisol is released by the _____.

a. sympathetic nervous system
b. hypothalamus
c. pituitary gland
d. adrenal glands

Critical Thinking Questions

Provide an example (other than the one described earlier) of a situation or event that could be appraised as either threatening or challenging.

Provide an example of a stressful situation that may cause a person to become seriously ill. How would Selye's general adaptation syndrome explain this occurrence?

Personal Application Question

Think of a time in which you and others you know (family members, friends, and classmates) experienced an event that some viewed as threatening and others viewed as challenging. What were some of the differences in the reactions of those who experienced the event as threatening compared to those who viewed the event as challenging? Why do you think there were differences in how these individuals judged the same event?

Glossary

Alarm reaction- First stage of the general adaptation syndrome; characterized as the body's immediate physiological reaction to a threatening situation or some other emergency; analogous to the fight-or-flight response

Cortisol-Stress hormone released by the adrenal glands when encountering a stressor; helps to provide a boost of energy, thereby preparing the individual to take action

Distress- Bad form of stress; usually high in intensity; often leads to exhaustion, fatigue, feeling burned out; associated with erosions in performance and health

Eustress- Good form of stress; low to moderate in intensity; associated with positive feelings, as well as optimal health and performance

fFght-or-flight response- Set of physiological reactions (increases in blood pressure, heart rate, respiration rate, and sweat) that occur when an individual encounters a perceived threat; these reactions are produced by activation of the sympathetic nervous system and the endocrine system

General adaptation syndrome- Hans Selye's three-stage model of the body's physiological reactions to stress and the process of stress adaptation: alarm reaction, stage of resistance, and stage of exhaustion

Health psychology- Subfield of psychology devoted to studying psychological influences on health, illness, and how people respond when they become ill

Hypothalamic-pituitary-adrenal (HPA) axis- Set of structures found in both the limbic system (hypothalamus) and the endocrine system (pituitary gland and adrenal glands) that regulate many of the body's physiological reactions to stress through the release of hormones

Primary appraisal- Judgment about the degree of potential harm or threat to well-being that a stressor might entail

Secondary appraisal- Judgment of options available to cope with a stressor and their potential effectiveness

Stage of exhaustion- Third stage of the general adaptation syndrome; the body's ability to resist stress becomes depleted; illness, disease, and even death may occur

Stage of resistance- Second stage of the general adaptation syndrome; the body adapts to a stressor for a period of time

Stress- Process whereby an individual perceives and responds to events that one appraises as overwhelming or threatening to one's well-being

Stressors- Environmental events that may be judged as threatening or demanding; stimuli that initiate the stress process

14.2 Stressors

For an individual to experience stress, he must first encounter a potential stressor. In general, stressors can be placed into one of two broad categories: chronic and acute. Chronic stressors include events that persist over an extended period of time, such as caring for a parent with dementia, long-term unemployment, or imprisonment. Acute stressors involve brief focal events that sometimes continue to be experienced as overwhelming well after the event has ended, such as falling on an icy sidewalk and breaking your leg (Cohen, Janicki-Deverts, & Miller, 2007). Whether chronic or acute, potential stressors come in many shapes and sizes. They can include major traumatic events, significant life changes, daily hassles, as well as other situations in which a person is regularly exposed to threat, challenge, or danger.

Traumatic Events

Some stressors involve traumatic events or situations in which a person is exposed to actual or threatened death or serious injury. Stressors in this category include exposure to military combat, threatened or actual physical assaults (e.g., physical attacks, sexual assault, robbery, childhood abuse), terrorist attacks, natural disasters (e.g., earthquakes, floods, hurricanes), and automobile accidents. Men, non-Whites, and individuals in lower socioeconomic status (SES) groups report experiencing a greater number of traumatic events than do women, Whites, and individuals in higher SES groups (Hatch & Dohrenwend, 2007). Some individuals who are exposed to stressors of extreme magnitude develop post-traumatic stress disorder (PTSD): a chronic stress reaction characterized by experiences and behaviors that may include intrusive and painful memories of the stressor event, jumpiness, persistent negative emotional states, detachment from others, angry outbursts, and avoidance of reminders of the event (American Psychiatric Association [APA], 2013).

Life Changes

Most stressors that we encounter are not nearly as intense as the ones described above. Many potential stressors we face involve events or situations that require us to make changes in our ongoing lives and require time as we adjust to those changes. Examples include death of a close family member, marriage, divorce, and moving (Figure).

Some fairly typical life events, such as moving, can be significant stressors. Even when the move is intentional and positive, the amount of resulting change in daily life can cause stress. (credit: "Jellaluna"/Flickr)

In the 1960s, psychiatrists Thomas Holmes and Richard Rahe wanted to examine the link between life stressors and physical illness, based on the hypothesis that life events requiring significant changes in a person's normal life routines are stressful, whether these events are desirable or undesirable. They developed the Social Readjustment

Rating Scale (SRRS), consisting of 43 life events that require varying degrees of personal readjustment (Holmes & Rahe, 1967). Many life events that most people would consider pleasant (e.g., holidays, retirement, marriage) are among those listed on the SRRS; these are examples of eustress. Holmes and Rahe also proposed that life events can add up over time, and that experiencing a cluster of stressful events increases one's risk of developing physical illnesses.

In developing their scale, Holmes and Rahe asked 394 participants to provide a numerical estimate for each of the 43 items; each estimate corresponded to how much readjustment participants felt each event would require. These estimates resulted in mean value scores for each event—often called life change units (LCUs) (Rahe, McKeen, & Arthur, 1967). The numerical scores ranged from 11 to 100, representing the perceived magnitude of life change each event entails. Death of a spouse ranked highest on the scale with 100 LCUs, and divorce ranked second highest with 73 LCUs. In addition, personal injury or illness, marriage, and job termination also ranked highly on the scale with 53, 50, and 47 LCUs, respectively. Conversely, change in residence (20 LCUs), change in eating habits (15 LCUs), and vacation (13 LCUs) ranked low on the scale (Table). Minor violations of the law ranked the lowest with 11 LCUs. To complete the scale, participants checked yes for events experienced within the last 12 months. LCUs for each checked item are totaled for a score quantifying the amount of life change. Agreement on the amount of adjustment required by the various life events on the SRRS is highly consistent, even cross-culturally (Holmes & Masuda, 1974).

Some Stressors on the Social Readjustment Rating Scale (Holmes & Rahe, 1967)

Life event	Life change units
Death of a close family member	63
Personal injury or illness	53
Dismissal from work	47
Change in financial state	38
Change to different line of work	36
Outstanding personal achievement	28
Beginning or ending school	26
Change in living conditions	25
Change in working hours or conditions	20

Some Stressors on the Social Readjustment Rating Scale (Holmes & Rahe, 1967)

Life event	Life change units
Change in residence	20
Change in schools	20
Change in social activities	18
Change in sleeping habits	16
Change in eating habits	15
Minor violation of the law	11

Extensive research has demonstrated that accumulating a high number of life change units within a brief period of time (one or two years) is related to a wide range of physical illnesses (even accidents and athletic injuries) and mental health problems (Monat & Lazarus, 1991; Scully, Tosi, & Banning, 2000). In an early demonstration, researchers obtained LCU scores for U.S. and Norwegian Navy personnel who were about to embark on a six-month voyage. A later examination of medical records revealed positive (but small) correlations between LCU scores prior to the voyage and subsequent illness symptoms during the ensuing six-month journey (Rahe, 1974). In addition, people tend to experience more physical symptoms, such as backache, upset stomach, diarrhea, and acne, on specific days in which self-reported LCU values are considerably higher than normal, such as the day of a family member's wedding (Holmes & Holmes, 1970).

The Social Readjustment Rating Scale (SRRS) provides researchers a simple, easy-to-administer way of assessing the amount of stress in people's lives, and it has been used in hundreds of studies (Thoits, 2010). Despite its widespread use, the scale has been subject to criticism. First, many of the items on the SRRS are vague; for example, death of a close friend could involve the death of a long-absent childhood friend that requires little social readjustment (Dohrenwend, 2006). In addition, some have challenged its assumption that undesirable life events are no more stressful than desirable ones (Derogatis & Coons, 1993). However, most of the available evidence suggests that, at least as far as mental health is concerned, undesirable or negative events are more strongly associated with poor outcomes (such as depression) than are desirable, positive events (Hatch & Dohrenwend, 2007). Perhaps the most serious criticism is that the scale does not take into consideration respondents' appraisals of the life events it contains. As you recall, appraisal of a stressor is a key element in the conceptualization and overall experience of stress. Being fired from work may be devastating to some but a welcome opportunity to obtain a better job for others. The SRRS remains one of the most well-known instruments in the study of stress, and it is a useful tool for identifying potential stress-related health outcomes (Scully et al., 2000).

Go to this site to complete the SRRS scale and determine the total number of LCUs you have experienced over the last year.

Correlational Research

The Holmes and Rahe Social Readjustment Rating Scale (SRRS) uses the correlational research method to identify the connection between stress and health. That is, respondents' LCU scores are correlated with the number or frequency of self-reported symptoms indicating health problems. These correlations are typically positive—as LCU scores increase, the number of symptoms increase. Consider all the thousands of studies that have used this scale to correlate stress and illness symptoms: If you were to assign an average correlation coefficient to this body of research, what would be your best guess? How strong do you think the correlation coefficient would be? Why can't the SRRS show a causal relationship between stress and illness? If it were possible to show causation, do you think stress causes illness or illness causes stress?

Hassles

Potential stressors do not always involve major life events. Daily hassles—the minor irritations and annoyances that are part of our everyday lives (e.g., rush hour traffic, lost keys, obnoxious coworkers, inclement weather, arguments with friends or family)—can build on one another and leave us just as stressed as life change events (Figure) (Kanner, Coyne, Schaefer, & Lazarus, 1981).

(a) (b)

Daily commutes, whether (a) on the road or (b) via public transportation, can be hassles that contribute to our feelings of everyday stress. (credit a: modification of work by Jeff Turner; credit b: modification of work by "epSos.de"/Flickr)

Researchers have demonstrated that the frequency of daily hassles is actually a better predictor of both physical and psychological health than are life change units. In a well-known study of San Francisco residents, the frequency of daily hassles was found to be more strongly associated with physical health problems than were life change events (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982). In addition, daily minor hassles, especially interpersonal conflicts, often lead to negative and distressed mood states (Bolger, DeLongis, Kessler, & Schilling, 1989). Cyber hassles that occur on social media may represent a new source of stress. In one investigation, undergraduates who,

over a 10-week period, reported greater Facebook-induced stress (e.g., guilt or discomfort over rejecting friend requests and anger or sadness over being unfriended by another) experienced increased rates of upper respiratory infections, especially if they had larger social networks (Campisi et al., 2012). Clearly, daily hassles can add up and take a toll on us both emotionally and physically.

Other Stressors

Stressors can include situations in which one is frequently exposed to challenging and unpleasant events, such as difficult, demanding, or unsafe working conditions. Although most jobs and occupations can at times be demanding, some are clearly more stressful than others (Figure). For example, most people would likely agree that a firefighter's work is inherently more stressful than that of a florist. Equally likely, most would agree that jobs containing various unpleasant elements, such as those requiring exposure to loud noise (heavy equipment operator), constant harassment and threats of physical violence (prison guard), perpetual frustration (bus driver in a major city), or those mandating that an employee work alternating day and night shifts (hotel desk clerk), are much more demanding—and thus, more stressful—than those that do not contain such elements. Table lists several occupations and some of the specific stressors associated with those occupations (Sulsky & Smith, 2005).

(a)

(b)

(a) Police officers and (b) firefighters hold high stress occupations. (credit a: modification of work by Australian Civil-Military Centre; credit b: modification of work by Andrew Magill)

Occupations and Their Related Stressors

Occupation	Stressors Specific to Occupation (Sulsky & Smith, 2005)
Police officer	physical dangers, excessive paperwork, red tape, dealing with court system, coworker and supervisor conflict, lack of support from the public
Firefighter	uncertainty over whether a serious fire or hazard awaits after an alarm
Social worker	little positive feedback from jobs or from the public, unsafe work environments, frustration in dealing with bureaucracy, excessive paperwork, sense of personal responsibility for clients, work overload
Teacher	Excessive paperwork, lack of adequate supplies or facilities, work overload, lack of positive feedback, vandalism, threat of physical violence
Nurse	Work overload, heavy physical work, patient concerns (dealing with death and medical concerns), interpersonal problems with other medical staff (especially physicians)
Emergency medical worker	Unpredictable and extreme nature of the job, inexperience
Air traffic controller	Little control over potential crisis situations and workload, fear of causing an accident, peak traffic situations, general work environment
Clerical and secretarial work	Little control over job mobility, unsupportive supervisors, work overload, lack of perceived control
Managerial work	Work overload, conflict and ambiguity in defining the managerial role, difficult work relationships

Although the specific stressors for these occupations are diverse, they seem to share two common denominators: heavy workload and uncertainty about and lack of control over certain aspects of a job.

Both of these factors contribute to job strain, a work situation that combines excessive job demands and workload with little discretion in decision making or job control (Karasek & Theorell, 1990). Clearly, many occupations other than the ones listed in

Table involve at least a moderate amount of job strain in that they often involve heavy workloads and little job control (e.g., inability to decide when to take breaks). Such jobs are often low-status and include those of factory workers, postal clerks, supermarket cashiers, taxi drivers, and short-order cooks. Job strain can have adverse consequences on both physical and mental health; it has been shown to be associated with increased risk of hypertension (Schnall & Landsbergis, 1994), heart attacks (Theorell et al., 1998), recurrence of heart disease after a first heart attack (Aboa-Éboulé et al., 2007), significant weight loss or gain (Kivimäki et al., 2006), and major depressive disorder (Stansfeld, Shipley, Head, & Fuhrer, 2012). A longitudinal study of over 10,000 British civil servants reported that workers under 50 years old who earlier had reported high job strain were 68% more likely to later develop heart disease than were those workers under 50 years old who reported little job strain (Chandola et al., 2008).

Some people who are exposed to chronically stressful work conditions can experience job burnout, which is a general sense of emotional exhaustion and cynicism in relation to one's job (Maslach & Jackson, 1981). Job burnout occurs frequently among those in human service jobs (e.g., social workers, teachers, therapists, and police officers). Job burnout consists of three dimensions. The first dimension is exhaustion—a sense that one's emotional resources are drained or that one is at the end of her rope and has nothing more to give at a psychological level. Second, job burnout is characterized by depersonalization: a sense of emotional detachment between the worker and the recipients of his services, often resulting in callous, cynical, or indifferent attitudes toward these individuals. Third, job burnout is characterized by diminished personal accomplishment, which is the tendency to evaluate one's work negatively by, for example, experiencing dissatisfaction with one's job-related accomplishments or feeling as though one has categorically failed to influence others' lives through one's work.

Job strain appears to be one of the greatest risk factors leading to job burnout, which is most commonly observed in workers who are older (ages 55–64), unmarried, and whose jobs involve manual labor. Heavy alcohol consumption, physical inactivity, being overweight, and having a physical or lifetime mental disorder are also associated with job burnout (Ahola, et al., 2006). In addition, depression often co-occurs with job burnout. One large-scale study of over 3,000 Finnish employees reported that half of the participants with severe job burnout had some form of depressive disorder (Ahola et al., 2005). Job burnout is often precipitated by feelings of having invested considerable energy, effort, and time into one's work while receiving little in return (e.g., little respect or support from others or low pay) (Tatris, Peeters, Le Blanc, Schreurs, & Schaufeli, 2001).

As an illustration, consider CharlieAnn, a nursing assistant who worked in a nursing home. CharlieAnn worked long hours for little pay in a difficult facility. Her supervisor was domineering, unpleasant, and unsupportive; he was disrespectful of CharlieAnn's personal time, frequently informing her at the last minute she must work several additional hours after her shift ended or that she must report to work on weekends.

CharlieAnn had very little autonomy at her job. She had little say in her day-to-day duties and how to perform them, and she was not permitted to take breaks unless her supervisor explicitly told her that she could. CharlieAnn did not feel as though her hard work was appreciated, either by supervisory staff or by the residents of the home. She was very unhappy over her low pay, and she felt that many of the residents treated her disrespectfully.

After several years, CharlieAnn began to hate her job. She dreaded going to work in the morning, and she gradually developed a callous, hostile attitude toward many of the residents. Eventually, she began to feel as though she could no longer help the nursing home residents. CharlieAnn's absenteeism from work increased, and one day she decided that she had had enough and quit. She now has a job in sales, vowing never to work in nursing again.

A humorous example illustrating lack of supervisory support can be found in the 1999 comedy *Office Space*. Follow this link to view a brief excerpt in which a sympathetic character's insufferable boss makes a last-minute demand that he "go ahead and come in" to the office on both Saturday and Sunday.

Finally, our close relationships with friends and family—particularly the negative aspects of these relationships—can be a potent source of stress. Negative aspects of close relationships can include adverse exchanges and conflicts, lack of emotional support or confiding, and lack of reciprocity. All of these can be overwhelming, threatening to the relationship, and thus stressful. Such stressors can take a toll both emotionally and physically. A longitudinal investigation of over 9,000 British civil servants found that those who at one point had reported the highest levels of negative interactions in their closest relationship were 34% more likely to experience serious heart problems (fatal or nonfatal heart attacks) over a 13–15 year period, compared to those who experienced the lowest levels of negative interaction (De Vogli, Chandola & Marmot, 2007).

Summary

Stressors can be chronic (long term) or acute (short term), and can include traumatic events, significant life changes, daily hassles, and situations in which people are frequently exposed to challenging and unpleasant events. Many potential stressors include events or situations that require us to make changes in our lives, such as a divorce or moving to a new residence. Thomas Holmes and Richard Rahe developed the Social Readjustment Rating Scale (SRRS) to measure stress by assigning a number of life change units to life events that typically require some adjustment, including positive events. Although the SRRS has been criticized on a number of grounds, extensive research has shown that the accumulation of many LCUs is associated with increased risk of illness. Many potential stressors also include daily hassles, which are minor irritations and annoyances that can build up over time. In addition, jobs that are especially demanding, offer little control over one's working

environment, or involve unfavorable working conditions can lead to job strain, thereby setting the stage for job burnout.

Review Questions

According to the Holmes and Rahe scale, which life event requires the greatest amount of readjustment?

a. marriage
b. personal illness
c. divorce
d. death of spouse

While waiting to pay for his weekly groceries at the supermarket, Paul had to wait about 20 minutes in a long line at the checkout because only one cashier was on duty. When he was finally ready to pay, his debit card was declined because he did not have enough money left in his checking account. Because he had left his credit cards at home, he had to place the groceries back into the cart and head home to retrieve a credit card. While driving back to his home, traffic was backed up two miles due to an accident. These events that Paul had to endure are best characterized as _____.

a. chronic stressors
b. acute stressors
c. daily hassles
d. readjustment occurrences

What is one of the major criticisms of the Social Readjustment Rating Scale?

a. It has too few items.
b. It was developed using only people from the New England region of the United States.
c. It does not take into consideration how a person appraises an event.
d. None of the items included are positive.

Which of the following is not a dimension of job burnout?

a. depersonalization
b. hostility
c. exhaustion
d. diminished personal accomplishment

Critical Thinking Questions

Review the items on the Social Readjustment Rating Scale. Select one of the items and discuss how it might bring about distress and eustress.

Job burnout tends to be high in people who work in human service jobs. Considering the three dimensions of job burnout, explain how various job aspects unique to being a police officer might lead to job burnout in that line of work.

Personal Application Question

Suppose you want to design a study to examine the relationship between stress and illness, but you cannot use the Social Readjustment Rating Scale. How would you go about measuring stress? How would you measure illness? What would you need to do in order to tell if there is a cause-effect relationship between stress and illness?

Glossary

Daily hassles- Minor irritations and annoyances that are part of our everyday lives and are capable of producing stress

Job burnout- General sense of emotional exhaustion and cynicism in relation to one's job; consists of three dimensions: exhaustion, depersonalization, and sense of diminished personal accomplishment

Job strain- Work situation involving the combination of excessive job demands and workload with little decision making latitude or job control

Social Readjustment Rating Scale (SRRS) - popular scale designed to measure stress; consists of 43 potentially stressful events, each of which has a numerical value quantifying how much readjustment is associated with the event

14.3 Stress and Illness

In this section, we will discuss stress and illness. As stress researcher Robert Sapolsky (1998) describes, stress-related disease emerges, predominantly, out of the fact that we so often activate a physiological system that has evolved for responding to acute physical emergencies, but we turn it on for months on end, worrying about mortgages, relationships, and promotions. (p. 6)

The stress response, as noted earlier, consists of a coordinated but complex system of physiological reactions that are called upon as needed. These reactions are beneficial at times because they prepare us to deal with potentially dangerous or threatening situations (for example, recall our old friend, the fearsome bear on the trail). However, health is affected when physiological reactions are sustained, as can happen in response to ongoing stress.

Psychophysiological Disorders

If the reactions that compose the stress response are chronic or if they frequently exceed normal ranges, they can lead to cumulative wear and tear on the body, in much the same way that running your air conditioner on full blast all summer will eventually cause wear and tear on it. For example, the high blood pressure that a person under considerable job strain experiences might eventually take a toll on his heart and set the stage for a heart attack or heart failure. Also, someone exposed to high levels of the stress hormone cortisol might become vulnerable to infection or disease because of weakened immune system functioning (McEwen, 1998).

Robert Sapolsky, a noted Stanford University neurobiologist and professor, has for over 30 years conducted extensive research on stress, its impact on our bodies, and how psychological tumult can escalate stress—even in baboons. Here are two videos featuring Dr. Sapolsky: one is regarding killer stress and the other is an excellent in-depth documentary from *National Geographic*.

Physical disorders or diseases whose symptoms are brought about or worsened by stress and emotional factors are called psychophysiological disorders. The physical symptoms of psychophysiological disorders are real and they can be produced or exacerbated by psychological factors (hence the *psycho* and *physiological* in psychophysiological). A list of frequently encountered psychophysiological disorders is provided in Table.

Types of Psychophysiological Disorders (adapted from Everly & Lating, 2002)

Type of Psychophysiological Disorder	Examples
Cardiovascular	hypertension, coronary heart disease
Gastrointestinal	irritable bowel syndrome
Respiratory	asthma, allergy
Musculoskeletal	low back pain, tension headaches
Skin	acne, eczema, psoriasis

In addition to stress itself, emotional upset and certain stressful personality traits have been proposed as potential contributors to ill health. Franz Alexander (1950), an early-20th-century psychoanalyst and physician, once postulated that various diseases are caused by specific unconscious conflicts. For example, he linked hypertension to repressed anger, asthma to separation anxiety, and ulcers to an unconscious desire to "remain in the dependent infantile situation—to be loved and cared for" (Alexander, 1950, p. 102). Although hypertension does appear to be linked to anger (as you will

learn below), Alexander's assertions have not been supported by research. Years later, Friedman and Booth-Kewley (1987), after statistically reviewing 101 studies examining the link between personality and illness, proposed the existence of disease-prone personality characteristics, including depression, anger/hostility, and anxiety. Indeed, a study of over 61,000 Norwegians identified depression as a risk factor for all major disease-related causes of death (Mykletun et al., 2007). In addition, neuroticism—a personality trait that reflects how anxious, moody, and sad one is—has been identified as a risk factor for chronic health problems and mortality (Ploubidis & Grundy, 2009).

Below, we discuss two kinds of psychophysiological disorders about which a great deal is known: cardiovascular disorders and asthma. First, however, it is necessary to turn our attention to a discussion of the immune system—one of the major pathways through which stress and emotional factors can lead to illness and disease.

Stress and the Immune System

In a sense, the immune system is the body's surveillance system. It consists of a variety of structures, cells, and mechanisms that serve to protect the body from invading toxins and microorganisms that can harm or damage the body's tissues and organs. When the immune system is working as it should, it keeps us healthy and disease free by eliminating bacteria, viruses, and other foreign substances that have entered the body (Everly & Lating, 2002).

Immune System Errors

Sometimes, the immune system will function erroneously. For example, sometimes it can go awry by mistaking your body's own healthy cells for invaders and repeatedly attacking them. When this happens, the person is said to have an autoimmune disease, which can affect almost any part of the body. How an autoimmune disease affects a person depends on what part of the body is targeted. For instance, rheumatoid arthritis, an autoimmune disease that affects the joints, results in joint pain, stiffness, and loss of function. Systemic lupus erythematosus, an autoimmune disease that affects the skin, can result in rashes and swelling of the skin. Grave's disease, an autoimmune disease that affects the thyroid gland, can result in fatigue, weight gain, and muscle aches (National Institute of Arthritis and Musculoskeletal and Skin Diseases [NIAMS], 2012).

In addition, the immune system may sometimes break down and be unable to do its job. This situation is referred to as immunosuppression, the decreased effectiveness of the immune system. When people experience immunosuppression, they become susceptible to any number of infections, illness, and diseases. For example, acquired immune deficiency syndrome (AIDS) is a serious and lethal disease that is caused by human immunodeficiency virus (HIV), which greatly weakens the immune system by infecting and destroying antibody-producing cells, thus rendering a person vulnerable to any of a number of opportunistic infections (Powell, 1996).

Stressors and Immune Function

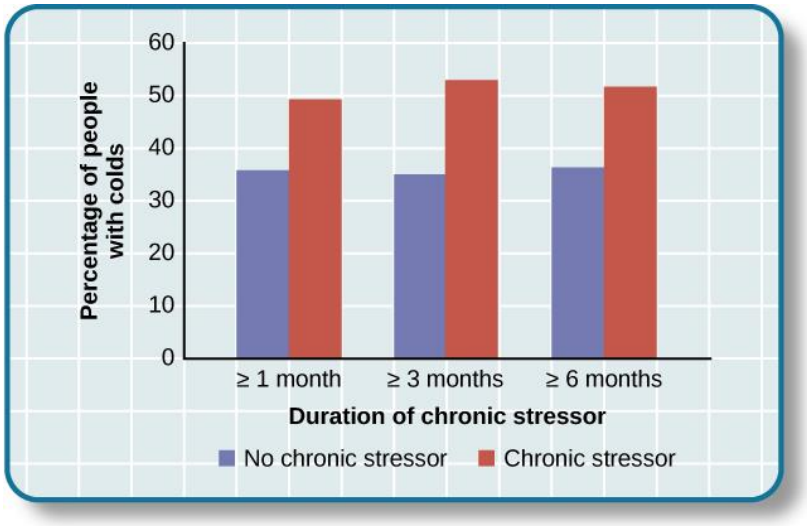
The question of whether stress and negative emotional states can influence immune function has captivated researchers for over three decades, and discoveries made over that time have dramatically changed the face of health psychology (Kiecolt-Glaser, 2009). Psychoneuroimmunology is the field that studies how psychological factors such as stress influence the immune system and immune functioning. The term psychoneuroimmunology was first coined in 1981, when it appeared as the title of a book that reviewed available evidence for associations between the brain, endocrine system, and immune system (Zacharie, 2009). To a large extent, this field evolved from the discovery that there is a connection between the central nervous system and the immune system.

Some of the most compelling evidence for a connection between the brain and the immune system comes from studies in which researchers demonstrated that immune responses in animals could be classically conditioned (Everly & Lating, 2002). For example, Ader and Cohen (1975) paired flavored water (the conditioned stimulus) with the presentation of an immunosuppressive drug (the unconditioned stimulus), causing sickness (an unconditioned response). Not surprisingly, rats exposed to this pairing developed a conditioned aversion to the flavored water. However, the taste of the water itself later produced immunosuppression (a conditioned response), indicating that the immune system itself had been conditioned. Many subsequent studies over the years have further demonstrated that immune responses can be classically conditioned in both animals and humans (Ader & Cohen, 2001). Thus, if classical conditioning can alter immunity, other psychological factors should be capable of altering it as well.

Hundreds of studies involving tens of thousands of participants have tested many kinds of brief and chronic stressors and their effect on the immune system (e.g., public speaking, medical school examinations, unemployment, marital discord, divorce, death of spouse, burnout and job strain, caring for a relative with Alzheimer's disease, and exposure to the harsh climate of Antarctica). It has been repeatedly demonstrated that many kinds of stressors are associated with poor or weakened immune functioning (Glaser & Kiecolt-Glaser, 2005; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Segerstrom & Miller, 2004).

When evaluating these findings, it is important to remember that there is a tangible physiological connection between the brain and the immune system. For example, the sympathetic nervous system innervates immune organs such as the thymus, bone marrow, spleen, and even lymph nodes (Maier, Watkins, & Fleshner, 1994). Also, we noted earlier that stress hormones released during hypothalamic-pituitary-adrenal (HPA) axis activation can adversely impact immune function. One way they do this is by inhibiting the production of lymphocytes, white blood cells that circulate in the body's fluids that are important in the immune response (Everly & Lating, 2002).

Some of the more dramatic examples demonstrating the link between stress and impaired immune function involve studies in which volunteers were exposed to viruses. The rationale behind this research is that because stress weakens the immune system, people with high stress levels should be more likely to develop an illness compared to those under little stress. In one memorable experiment using this method, researchers interviewed 276 healthy volunteers about recent stressful experiences (Cohen et al., 1998). Following the interview, these participants were given nasal drops containing the cold virus (in case you are wondering why anybody would ever want to participate in a study in which they are subjected to such treatment, the participants were paid $800 for their trouble). When examined later, participants who reported experiencing chronic stressors for more than one month—especially enduring difficulties involving work or relationships—were considerably more likely to have developed colds than were participants who reported no chronic stressors (Figure).



This graph shows the percentages of participants who developed colds (after receiving the cold virus) after reporting having experienced chronic stressors lasting at least one month, three months, and six months (adapted from Cohen et al., 1998).

In another study, older volunteers were given an influenza virus vaccination. Compared to controls, those who were caring for a spouse with Alzheimer's disease (and thus were under chronic stress) showed poorer antibody response following the vaccination (Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996).

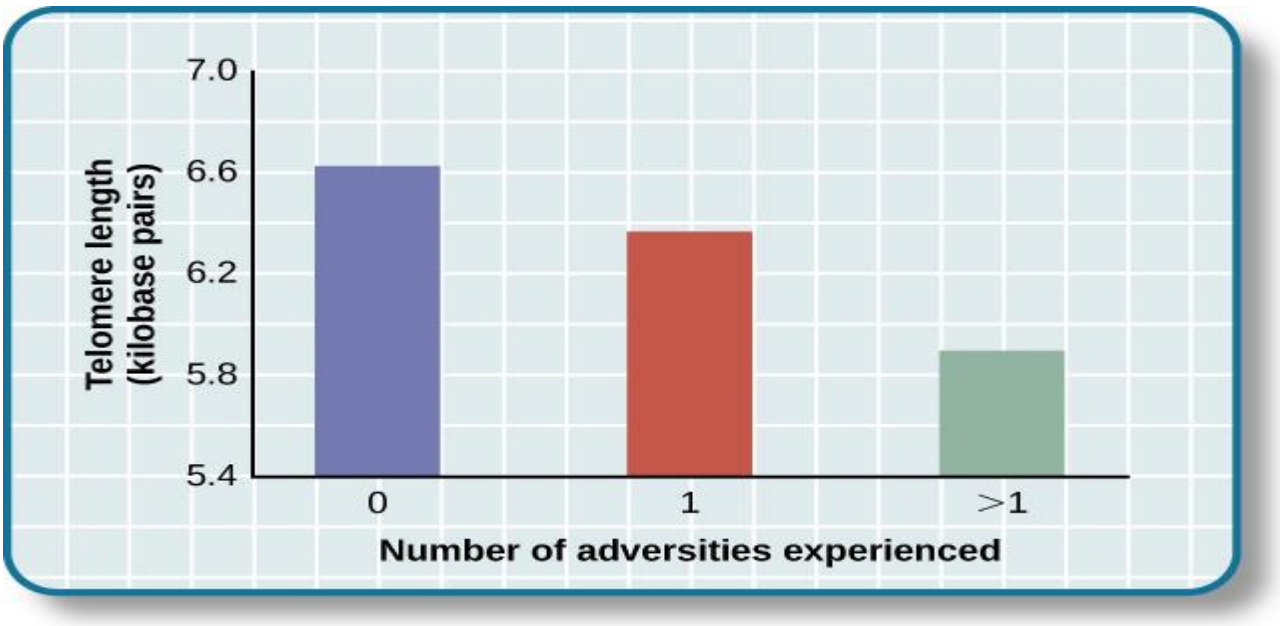
Other studies have demonstrated that stress slows down wound healing by impairing immune responses important to wound repair (Glaser & Kiecolt-Glaser, 2005). In one study, for example, skin blisters were induced on the forearm. Subjects who reported higher levels of stress produced lower levels of immune proteins necessary for wound healing (Glaser et al., 1999). Stress, then, is not so much the sword that kills the knight, so to speak; rather, it's the sword that breaks the knight's shield, and your immune system is that shield.

Stress and Aging: A Tale of Telomeres

Have you ever wondered why people who are stressed often seem to have a haggard look about them? A pioneering study from 2004 suggests that the reason is because stress can actually accelerate the cell biology of aging.

Stress, it seems, can shorten telomeres, which are segments of DNA that protect the ends of chromosomes. Shortened telomeres can inhibit or block cell division, which includes growth and proliferation of new cells, thereby leading to more rapid aging (Sapolsky, 2004). In the study, researchers compared telomere lengths in the white blood cells in mothers of chronically ill children to those of mothers of healthy children (Epel et al., 2004). Mothers of chronically ill children would be expected to experience more stress than would mothers of healthy children. The longer a mother had spent caring for her ill child, the shorter her telomeres (the correlation between years of caregiving and telomere length was $r = -.40$). In addition, higher levels of perceived stress were negatively correlated with telomere size ($r = -.31$). These researchers also found that the average telomere length of the most stressed mothers, compared to the least stressed, was similar to what you would find in people who were 9–17 years older than they were on average.

Numerous other studies since have continued to find associations between stress and eroded telomeres (Blackburn & Epel, 2012). Some studies have even demonstrated that stress can begin to erode telomeres in childhood and perhaps even before children are born. For example, childhood exposure to violence (e.g., maternal domestic violence, bullying victimization, and physical maltreatment) was found in one study to accelerate telomere erosion from ages 5 to 10 (Shalev et al., 2013). Another study reported that young adults whose mothers had experienced severe stress during their pregnancy had shorter telomeres than did those whose mothers had stress-free and uneventful pregnancies (Entringer et al., 2011). Further, the corrosive effects of childhood stress on telomeres can extend into young adulthood. In an investigation of over 4,000 U.K. women ages 41–80, adverse experiences during childhood (e.g., physical abuse, being sent away from home, and parent divorce) were associated with shortened telomere length (Surtees et al., 2010), and telomere size decreased as the amount of experienced adversity increased (Figure).



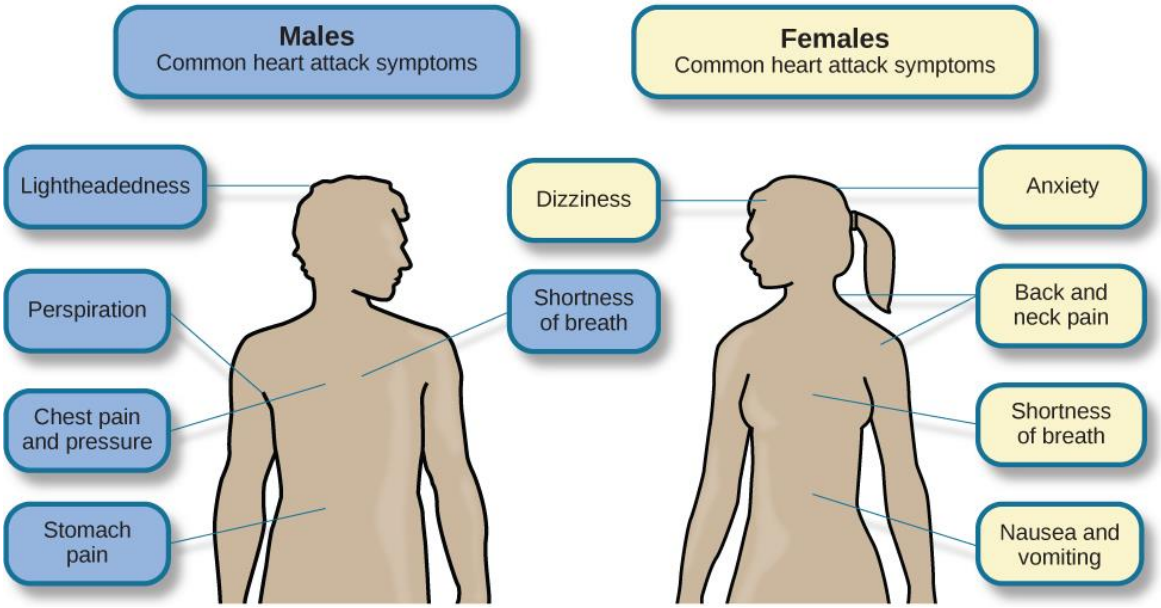
Telomeres are shorter in adults who experienced more trauma as children (adapted from Blackburn & Epel, 2012)..

Efforts to dissect the precise cellular and physiological mechanisms linking short telomeres to stress and disease are currently underway. For the time being, telomeres provide us with yet another reminder that stress, especially during early life, can be just as harmful to our health as smoking or fast food (Blackburn & Epel, 2012).

Cardiovascular Disorders

The cardiovascular system is composed of the heart and blood circulation system. For many years, disorders that involve the cardiovascular system—known as cardiovascular disorders—have been a major focal point in the study of psychophysiological disorders because of the cardiovascular system's centrality in the stress response (Everly & Lating, 2002). **Heart disease** is one such condition. Each year, heart disease causes approximately one in three deaths in the United States, and it is the leading cause of death in the developed world (Centers for Disease Control and Prevention [CDC], 2011; Shapiro, 2005).

The symptoms of heart disease vary somewhat depending on the specific kind of heart disease one has, but they generally involve angina—chest pains or discomfort that occur when the heart does not receive enough blood (Office on Women's Health, 2009). The pain often feels like the chest is being pressed or squeezed; burning sensations in the chest and shortness of breath are also commonly reported. Such pain and discomfort can spread to the arms, neck, jaws, stomach (as nausea), and back (American Heart Association [AHA], 2012a) (Figure).



Males and females often experience different symptoms of a heart attack.

A major risk factor for heart disease is hypertension, which is high blood pressure. Hypertension forces a person's heart to pump harder, thus putting more physical strain on the heart. If left unchecked, hypertension can lead to a heart attack, stroke, or heart failure; it can also lead to kidney failure and blindness. Hypertension is a serious cardiovascular disorder, and it is sometimes called the silent killer because it has no symptoms—one who has high blood pressure may not even be aware of it (AHA, 2012b).

Many risk factors contributing to cardiovascular disorders have been identified. These risk factors include social determinants such as aging, income, education, and employment status, as well as behavioral risk factors that include unhealthy diet, tobacco use, physical inactivity, and excessive alcohol consumption; obesity and diabetes are additional risk factors (World Health Organization [WHO], 2013).

Over the past few decades, there has been much greater recognition and awareness of the importance of stress and other psychological factors in cardiovascular health (Nusair, Al-dadah, & Kumar, 2012). Indeed, exposure to stressors of many kinds has also been linked to cardiovascular problems; in the case of hypertension, some of these stressors include job strain (Trudel, Brisson, & Milot, 2010), natural disasters (Saito, Kim, Maekawa, Ikeda, & Yokoyama, 1997), marital conflict (Nealey-Moore, Smith, Uchino, Hawkins, & Olson-Cerny, 2007), and exposure to high traffic noise levels at one's home (de Kluizenaar, Gansevoort, Miedema, & de Jong, 2007). Perceived discrimination appears to be associated with hypertension among African Americans (Sims et al., 2012). In addition, laboratory-based stress tasks, such as performing mental arithmetic under time pressure, immersing one's hand into ice water (known as the cold pressor test), mirror tracing, and public speaking have all been shown to elevate blood pressure (Phillips, 2011).

Are you Type A or Type B?

Sometimes research ideas and theories emerge from seemingly trivial observations. In the 1950s, cardiologist Meyer Friedman was looking over his waiting room furniture, which consisted of upholstered chairs with armrests. Friedman decided to have these chairs reupholstered. When the man doing the reupholstering came to the office to do the work, he commented on how the chairs were worn in a unique manner—the front edges of the cushions were worn down, as were the front tips of the arm rests. It seemed like the cardiology patients were tapping or squeezing the front of the armrests, as well as literally sitting on the edge of their seats (Friedman & Rosenman, 1974). Were cardiology patients somehow different than other types of patients? If so, how?

After researching this matter, Friedman and his colleague, Ray Rosenman, came to understand that people who are prone to heart disease tend to think, feel, and act differently than those who are not. These individuals tend to be intensively driven workaholics who are preoccupied with deadlines and always seem to be in a rush. According to Friedman and Rosenman, these individuals exhibit Type A behavior pattern; those who are more relaxed and laid-back were characterized as Type B (Figure). In a sample of Type As and Type Bs, Friedman and Rosenman were startled to discover that heart disease was over seven times more frequent among the Type As than the Type Bs (Friedman & Rosenman, 1959).

(a)

(b)

(*a) Type A individuals are characterized as intensely driven, (b) while Type B people are characterized as laid-back and relaxed. (credit a: modification of work by Greg Hernandez; credit b: modification of work by Elvert Barnes)*

The major components of the Type A pattern include an aggressive and chronic struggle to achieve more and more in less and less time (Friedman & Rosenman, 1974). Specific characteristics of the Type A pattern include an excessive competitive drive, chronic sense of time urgency, impatience, and hostility toward others (particularly those who get in the person's way).

An example of a person who exhibits Type A behavior pattern is Jeffrey. Even as a child, Jeffrey was intense and driven. He excelled at school, was captain of the swim team, and graduated with honors from an Ivy League college. Jeffrey never seems able to relax; he is always working on something, even on the weekends. However, Jeffrey always seems to feel as though there are not enough hours in the day to accomplish all he feels he should. He volunteers to take on extra tasks at work and often brings his work home with him; he often goes to bed angry late at night because he feels that he has not done enough. Jeffrey is quick tempered with his coworkers; he often becomes noticeably agitated when dealing with those coworkers he feels work too slowly or whose work does not meet his standards. He typically reacts with hostility when interrupted at work. He has experienced problems in his marriage over his lack of time spent with family. When caught in traffic during his commute to and from work, Jeffrey incessantly pounds on his horn and swears loudly at other drivers. When Jeffrey was 52, he suffered his first heart attack.

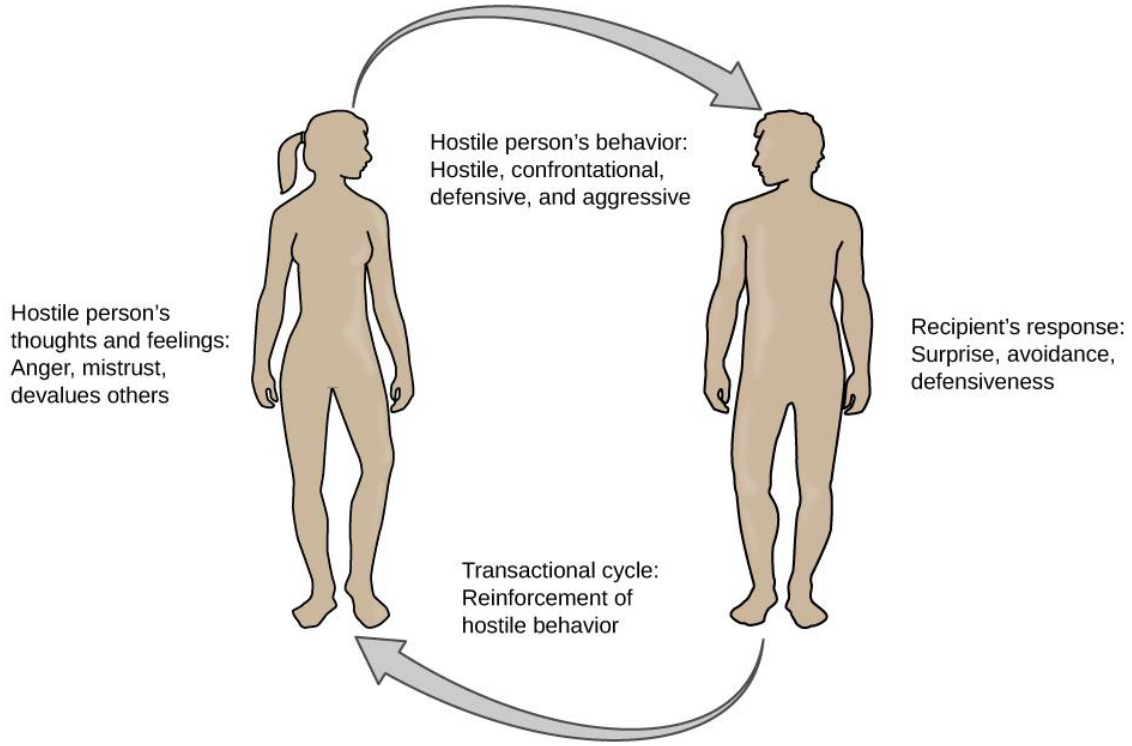
By the 1970s, a majority of practicing cardiologists believed that Type A behavior pattern was a significant risk factor for heart disease (Friedman, 1977). Indeed, a number of early longitudinal investigations demonstrated a link between Type A behavior pattern and later development of heart disease (Rosenman et al., 1975; Haynes, Feinleib, & Kannel, 1980).

Subsequent research examining the association between Type A and heart disease, however, failed to replicate these earlier findings (Glassman, 2007; Myrtek, 2001). Because Type A theory did not pan out as well as they had hoped, researchers shifted their attention toward determining if any of the specific elements of Type A predict heart disease.

Extensive research clearly suggests that the anger/hostility dimension of Type A behavior pattern may be one of the most important factors in the development of heart disease. This relationship was initially described in the Haynes et al. (1980) study mentioned above: Suppressed hostility was found to substantially elevate the risk of heart disease for both men and women. Also, one investigation followed over 1,000 male medical students from 32 to 48 years. At the beginning of the study, these men completed a questionnaire assessing how they react to pressure; some indicated that they respond with high levels of anger, whereas others indicated that they respond with less anger. Decades later, researchers found that those who earlier had indicated the highest levels of anger were over 6 times more likely than those who indicated less anger to have had a heart attack by age 55, and they were 3.5 times more likely to have experienced heart disease by the same age (Chang, Ford, Meoni, Wang, & Klag, 2002). From a health standpoint, it clearly does not pay to be an angry young person.

After reviewing and statistically summarizing 35 studies from 1983 to 2006, Chida and Steptoe (2009) concluded that the bulk of the evidence suggests that anger and hostility constitute serious long-term risk factors for adverse cardiovascular outcomes among both healthy individuals and those already suffering from heart disease. One reason

angry and hostile moods might contribute to cardiovascular diseases is that such moods can create social strain, mainly in the form of antagonistic social encounters with others. This strain could then lay the foundation for disease-promoting cardiovascular responses among hostile individuals (Vella, Kamarck, Flory, & Manuck, 2012). In this transactional model, hostility and social strain form a cycle (Figure).



According to the transactional model of hostility for predicting social interactions (Vella et al., 2012), the thoughts and feelings of a hostile person promote antagonistic behavior toward others, which in turn reinforces complimentary reactions from others, thereby intensifying ones' hostile disposition and intensifying the cyclical nature of this relationship.

For example, suppose Kaitlin has a hostile disposition; she has a cynical, distrustful attitude toward others and often thinks that other people are out to get her. She is very defensive around people, even those she has known for years, and she is always looking for signs that others are either disrespecting or belittling her. In the shower each morning before work, she often mentally rehearses what she would say to someone who said or did something that angered her, such as making a political statement that was counter to her own ideology. As Kaitlin goes through these mental rehearsals, she often grins and thinks about the retaliation on anyone who will irk her that day.

Socially, she is confrontational and tends to use a harsh tone with people, which often leads to very disagreeable and sometimes argumentative social interactions. As you might imagine, Kaitlin is not especially popular with others, including coworkers, neighbors, and even members of her own family. They either avoid her at all costs or snap back at her, which causes Kaitlin to become even more cynical and distrustful of

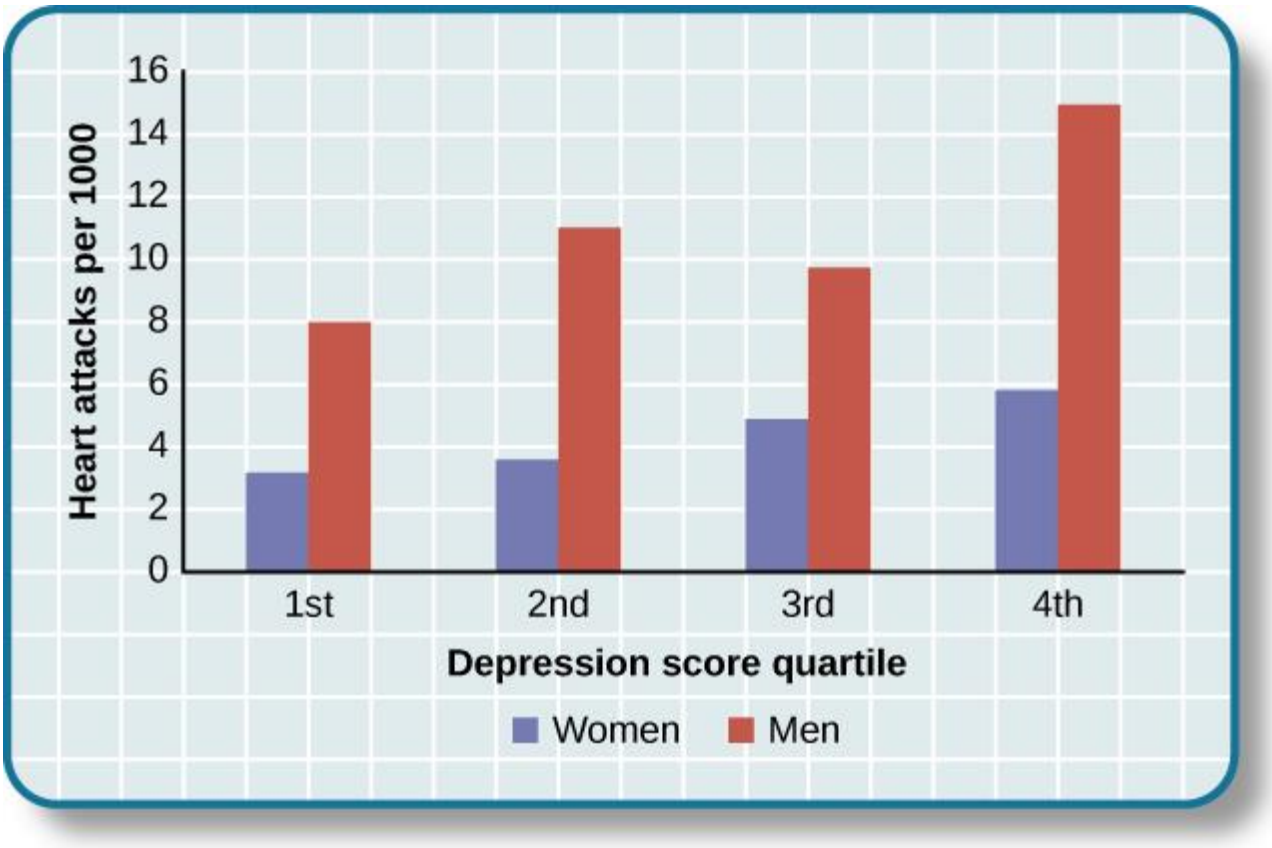
others, making her disposition even more hostile. Kaitlin's hostility—through her own doing—has created an antagonistic environment that cyclically causes her to become even more hostile and angry, thereby potentially setting the stage for cardiovascular problems.

In addition to anger and hostility, a number of other negative emotional states have been linked with heart disease, including negative affectivity and depression (Suls & Bunde, 2005). Negative affectivity is a tendency to experience distressed emotional states involving anger, contempt, disgust, guilt, fear, and nervousness (Watson, Clark, & Tellegen, 1988). It has been linked with the development of both hypertension and heart disease. For example, over 3,000 initially healthy participants in one study were tracked longitudinally, up to 22 years. Those with higher levels of negative affectivity at the time the study began were substantially more likely to develop and be treated for hypertension during the ensuing years than were those with lower levels of negative affectivity (Jonas & Lando, 2000). In addition, a study of over 10,000 middle-aged London-based civil servants who were followed an average of 12.5 years revealed that those who earlier had scored in the upper third on a test of negative affectivity were 32% more likely to have experienced heart disease, heart attack, or angina over a period of years than were those who scored in the lowest third (Nabi, Kivimaki, De Vogli, Marmot, & Singh-Manoux, 2008). Hence, negative affectivity appears to be a potentially vital risk factor for the development of cardiovascular disorders.

Depression and the Heart

For centuries, poets and folklore have asserted that there is a connection between moods and the heart (Glassman & Shapiro, 1998). You are no doubt familiar with the notion of a broken heart following a disappointing or depressing event and have encountered that notion in songs, films, and literature.

Perhaps the first to recognize the link between depression and heart disease was Benjamin Malzberg (1937), who found that the death rate among institutionalized patients with melancholia (an archaic term for depression) was six times higher than that of the population. A classic study in the late 1970s looked at over 8,000 manic-depressive persons in Denmark, finding a nearly 50% increase in deaths from heart disease among these patients compared with the general Danish population (Weeke, 1979). By the early 1990s, evidence began to accumulate showing that depressed individuals who were followed for long periods of time were at increased risk for heart disease and cardiac death (Glassman, 2007). In one investigation of over 700 Denmark residents, those with the highest depression scores were 71% more likely to have experienced a heart attack than were those with lower depression scores (Barefoot & Schroll, 1996). Figure illustrates the gradation in risk of heart attacks for both men and women.



This graph shows the incidence of heart attacks among men and women by depression score quartile (adapted from Barefoot & Schroll, 1996).

After more than two decades of research, it is now clear that a relationship exists: Patients with heart disease have more depression than the general population, and people with depression are more likely to eventually develop heart disease and experience higher mortality than those who do not have depression (Hare, Toukhsati, Johansson, & Jaarsma, 2013); the more severe the depression, the higher the risk (Glassman, 2007). Consider the following:

- In one study, death rates from cardiovascular problems was substantially higher in depressed people; depressed men were 50% more likely to have died from cardiovascular problems, and depressed women were 70% more likely (Ösby, Brandt, Correia, Ekbom, & Sparén, 2001).
- A statistical review of 10 longitudinal studies involving initially healthy individuals revealed that those with elevated depressive symptoms have, on average, a 64% greater risk of developing heart disease than do those with fewer symptoms (Wulsin & Singal, 2003).
- A study of over 63,000 registered nurses found that those with more depressed symptoms when the study began were 49% more likely to experience fatal heart disease over a 12-year period (Whang et al., 2009).

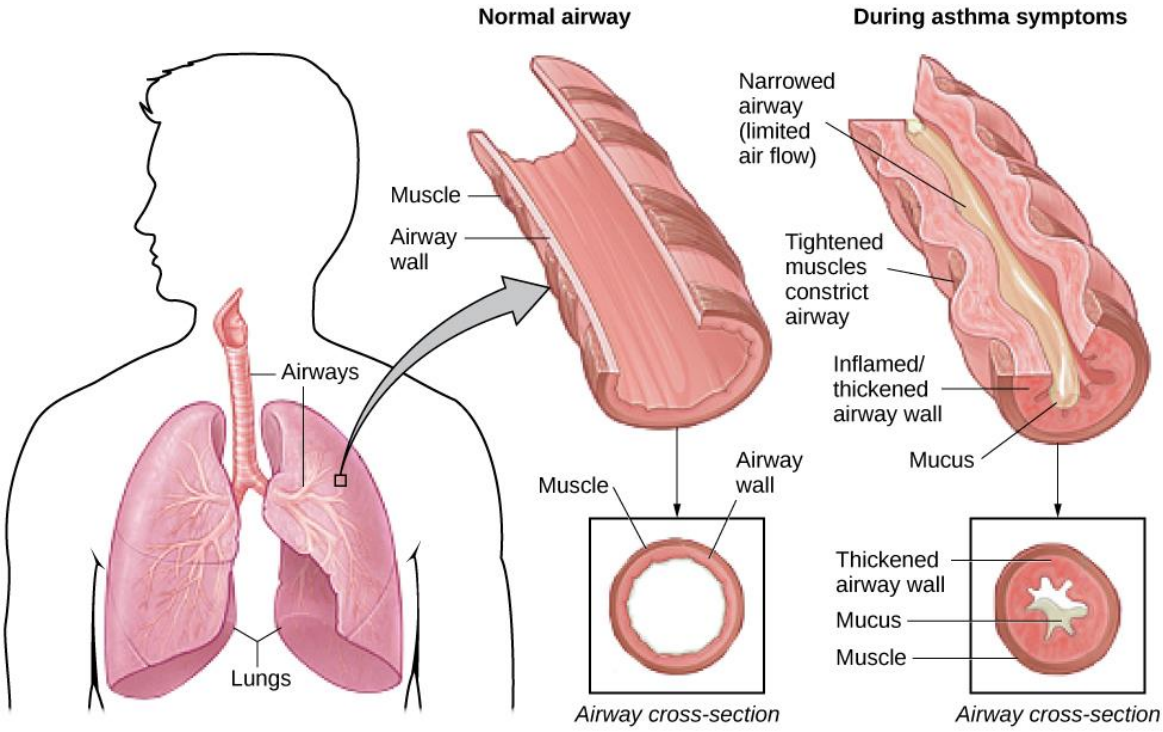
The American Heart Association, fully aware of the established importance of depression in cardiovascular diseases, several years ago recommended routine depression screening for all heart disease patients (Lichtman et al., 2008). Recently, they have recommended including depression as a risk factor for heart disease patients (AHA, 2014).

Although the exact mechanisms through which depression might produce heart problems have not been fully clarified, a recent investigation examining this connection in early life has shed some light. In an ongoing study of childhood depression, adolescents who had been diagnosed with depression as children were more likely to be obese, smoke, and be physically inactive than were those who had not received this diagnosis (Rottenberg et al., 2014). One implication of this study is that depression, especially if it occurs early in life, may increase the likelihood of living an unhealthy lifestyle, thereby predisposing people to an unfavorable cardiovascular disease risk profile.

It is important to point out that depression may be just one piece of the emotional puzzle in elevating the risk for heart disease, and that chronically experiencing several negative emotional states may be especially important. A longitudinal investigation of Vietnam War veterans found that depression, anxiety, hostility, and trait anger each independently predicted the onset of heart disease (Boyle, Michalek, & Suarez, 2006). However, when each of these negative psychological attributes was combined into a single variable, this new variable (which researchers called psychological risk factor) predicted heart disease more strongly than any of the individual variables. Thus, rather than examining the predictive power of isolated psychological risk factors, it seems crucial for future researchers to examine the effects of combined and more general negative emotional and psychological traits in the development of cardiovascular illnesses.

Asthma

Asthma is a chronic and serious disease in which the airways of the respiratory system become obstructed, leading to great difficulty expelling air from the lungs. The airway obstruction is caused by inflammation of the airways (leading to thickening of the airway walls) and a tightening of the muscles around them, resulting in a narrowing of the airways (Figure) (American Lung Association, 2010). Because airways become obstructed, a person with asthma will sometimes have great difficulty breathing and will experience repeated episodes of wheezing, chest tightness, shortness of breath, and coughing, the latter occurring mostly during the morning and night (CDC, 2006).



In asthma, the airways become inflamed and narrowed.

According to the Centers for Disease Control and Prevention (CDC), around 4,000 people die each year from asthma-related causes, and asthma is a contributing factor to another 7,000 deaths each year (CDC, 2013a). The CDC has revealed that asthma affects 18.7 million U.S. adults and is more common among people with lower education and income levels (CDC, 2013b). Especially concerning is that asthma is on the rise, with rates of asthma increasing 157% between 2000 and 2010 (CDC, 2013b).

Asthma attacks are acute episodes in which an asthma sufferer experiences the full range of symptoms. Asthma exacerbation is often triggered by environmental factors, such as air pollution, allergens (e.g., pollen, mold, and pet hairs), cigarette smoke, airway infections, cold air or a sudden change in temperature, and exercise (CDC, 2013b).

Psychological factors appear to play an important role in asthma (Wright, Rodriguez, & Cohen, 1998), although some believe that psychological factors serve as potential triggers in only a subset of asthma patients (Ritz, Steptoe, Bobb, Harris, & Edwards, 2006). Many studies over the years have demonstrated that some people with asthma will experience asthma-like symptoms if they expect to experience such symptoms, such as when breathing an inert substance that they(falsely) believe will lead to airway obstruction (Sodergren & Hyland, 1999). As stress and emotions directly affect immune and respiratory functions, psychological factors likely serve as one of the most common triggers of asthma exacerbation (Trueba & Ritz, 2013).

People with asthma tend to report and display a high level of negative emotions such as anxiety, and asthma attacks have been linked to periods of high emotionality (Lehrer, Isenberg, & Hochron, 1993). In addition, high levels of emotional distress during both laboratory tasks and daily life have been found to negatively affect airway function and can produce asthma-like symptoms in people with asthma (von Leupoldt, Ehnes, & Dahme, 2006). In one investigation, 20 adults with asthma wore preprogrammed wristwatches that signaled them to breathe into a portable device that measures airway function. Results showed that higher levels of negative emotions and stress were associated with increased airway obstruction and self-reported asthma symptoms (Smyth, Soefer, Hurewitz, Kliment, & Stone, 1999). In addition, D'Amato, Liccardi, Cecchi, Pellegrino, & D'Amato (2010) described a case study of an 18-year-old man with asthma whose girlfriend had broken up with him, leaving him in a depressed state. She had also unfriended him on Facebook , while friending other young males. Eventually, the young man was able to "friend" her once again and could monitor her activity through Facebook. Subsequently, he would experience asthma symptoms whenever he logged on and accessed her profile. When he later resigned not to use Facebook any longer, the asthma attacks stopped. This case suggests that the use of Facebook and other forms of social media may represent a new source of stress—it may be a triggering factor for asthma attacks, especially in depressed asthmatic individuals.

Exposure to stressful experiences, particularly those that involve parental or interpersonal conflicts, has been linked to the development of asthma throughout the lifespan. A longitudinal study of 145 children found that parenting difficulties during the first year of life increased the chances that the child developed asthma by 107% (Klinnert et al., 2001). In addition, a cross-sectional study of over 10,000 Finnish college students found that high rates of parent or personal conflicts (e.g., parental divorce, separation from spouse, or severe conflicts in other long-term relationships) increased the risk of asthma onset (Kilpeläinen, Koskenvuo, Helenius, & Terho, 2002). Further, a study of over 4,000 middle-aged men who were interviewed in the early 1990s and again a decade later found that breaking off an important life partnership (e.g., divorce or breaking off relationship from parents) increased the risk of developing asthma by 124% over the time of the study (Loerbroks, Apfelbacher, Thayer, Debling, & Stürmer, 2009).

Tension Headaches

A headache is a continuous pain anywhere in the head and neck region. Migraine headaches are a type of headache thought to be caused by blood vessel swelling and increased blood flow (McIntosh, 2013). Migraines are characterized by severe pain on one or both sides of the head, an upset stomach, and disturbed vision. They are more frequently experienced by women than by men (American Academy of Neurology, 2014). Tension headaches are triggered by tightening/tensing of facial and neck muscles; they are the most commonly experienced kind of headache, accounting for about 42% of all headaches worldwide (Stovner et al., 2007). In the United States, well

over one-third of the population experiences tension headaches each year, and 2–3% of the population suffers from chronic tension headaches (Schwartz, Stewart, Simon, & Lipton, 1998).

A number of factors can contribute to tension headaches, including sleep deprivation, skipping meals, eye strain, overexertion, muscular tension caused by poor posture, and stress (MedicineNet, 2013). Although there is uncertainty regarding the exact mechanisms through which stress can produce tension headaches, stress has been demonstrated to increase sensitivity to pain (Caceres & Burns, 1997; Logan et al., 2001). In general, tension headache sufferers, compared to non-sufferers, have a lower threshold for and greater sensitivity to pain (Ukestad & Wittrock, 1996), and they report greater levels of subjective stress when faced with a stressor (Myers, Wittrock, & Foreman, 1998). Thus, stress may contribute to tension headaches by increasing pain sensitivity in already-sensitive pain pathways in tension headache sufferers (Cathcart, Petkov, & Pritchard, 2008).

Summary

Psychophysiological disorders are physical diseases that are either brought about or worsened by stress and other emotional factors. One of the mechanisms through which stress and emotional factors can influence the development of these diseases is by adversely affecting the body's immune system. A number of studies have demonstrated that stress weakens the functioning of the immune system. Cardiovascular disorders are serious medical conditions that have been consistently shown to be influenced by stress and negative emotions, such as anger, negative affectivity, and depression. Other psychophysiological disorders that are known to be influenced by stress and emotional factors include asthma and tension headaches.

Review Questions

The white blood cells that attack foreign invaders to the body are called _____.

a. antibodies
b. telomeres
c. lymphocytes
d. immune cells

The risk of heart disease is especially high among individuals with _____.

a. depression
b. asthma
c. telomeres
d. lymphocytes

The most lethal dimension of Type A behavior pattern seems to be _____.

a. hostility
b. impatience
c. time urgency
d. competitive drive

Which of the following statements pertaining to asthma is *false*?

a. Parental and interpersonal conflicts have been tied to the development of asthma.
b. Asthma sufferers can experience asthma-like symptoms simply by believing that an inert substance they breathe will lead to airway obstruction.
c. Asthma has been shown to be linked to periods of depression.
d. Rates of asthma have decreased considerably since 2000.

Critical Thinking Questions

Discuss the concept of Type A behavior pattern, its history, and what we now know concerning its role in heart disease.

Consider the study in which volunteers were given nasal drops containing the cold virus to examine the relationship between stress and immune function (Cohen et al., 1998). How might this finding explain how people seem to become sick during stressful times in their lives (e.g., final exam week)?

Personal Application Question

If a family member or friend of yours has asthma, talk to that person (if he or she is willing) about their symptom triggers. Does this person mention stress or emotional states? If so, are there any commonalities in these asthma triggers?

Glossary

Asthma-Psychophysiological disorder in which the airways of the respiratory system become obstructed, leading to great difficulty expelling air from the lungs

cardiovascular disorders- Disorders that involve the heart and blood circulation system

Heart disease- Several types of adverse heart conditions, including those that involve the heart's arteries or valves or those involving the inability of the heart to pump enough blood to meet the body's needs; can include heart attack and stroke

Hypertension- High blood pressure

Immune system- Various structures, cells, and mechanisms that protect the body from foreign substances that can damage the body's tissues and organs

Immunosuppression- Decreased effectiveness of the immune system

Lymphocytes- White blood cells that circulate in the body's fluids and are especially important in the body's immune response

Negative affectivity- Tendency to experience distressed emotional states involving anger, contempt, disgust, guilt, fear, and nervousness

Psychoneuroimmunology- Field that studies how psychological factors (such as stress) influence the immune system and immune functioning

Psychophysiological disorders- Physical disorders or diseases in which symptoms are brought about or worsened by stress and emotional factors

Type A- Psychological and behavior pattern exhibited by individuals who tend to be extremely competitive, impatient, rushed, and hostile toward others

Type B- Psychological and behavior pattern exhibited by a person who is relaxed and laid back.

14.4 Regulation of Stress

As we learned in the previous section, stress—especially if it is chronic—takes a toll on our bodies and can have enormously negative health implications. When we experience events in our lives that we appraise as stressful, it is essential that we use effective coping strategies to manage our stress. Coping refers to mental and behavioral efforts that we use to deal with problems relating to stress, including its presumed cause and the unpleasant feelings and emotions it produces.

Coping Styles

Lazarus and Folkman (1984) distinguished two fundamental kinds of coping: problem-focused coping and emotion-focused coping. In problem-focused coping, one attempts to manage or alter the problem that is causing one to experience stress (i.e., the stressor). Problem-focused coping strategies are similar to strategies used in everyday problem-solving: they typically involve identifying the problem, considering possible solutions, weighing the costs and benefits of these solutions, and then selecting an alternative (Lazarus & Folkman, 1984). As an example, suppose Bradford receives a midterm notice that he is failing statistics class. If Bradford adopts a problem-focused coping approach to managing his stress, he would be proactive in trying to alleviate the source of the stress. He might contact his professor to discuss what must be done to raise his grade, he might also decide to set aside two hours daily to study statistics assignments, and he may seek tutoring assistance. A problem-focused approach to managing stress means we actively try to do things to address the problem.

Emotion-focused coping, in contrast, consists of efforts to change or reduce the negative emotions associated with stress. These efforts may include avoiding, minimizing, or distancing oneself from the problem, or positive comparisons with others ("I'm not as bad off as she is"), or seeking something positive in a negative event ("Now that I've been fired, I can sleep in for a few days"). In some cases, emotion-focused coping strategies involve reappraisal, whereby the stressor is construed differently (and somewhat self-deceptively) without changing its objective level of threat (Lazarus & Folkman, 1984). For example, a person sentenced to federal prison who thinks, "This will give me a great chance to network with others," is using reappraisal. If Bradford adopted an emotion-focused approach to managing his midterm deficiency stress, he might watch a comedy movie, play video games, or spend hours on Twitter to take his mind off the situation. In a certain sense, emotion-focused coping can be thought of as treating the symptoms rather than the actual cause.

While many stressors elicit both kinds of coping strategies, problem-focused coping is more likely to occur when encountering stressors we perceive as controllable, while emotion-focused coping is more likely to predominate when faced with stressors that we believe we are powerless to change (Folkman & Lazarus, 1980). Clearly, emotion-focused coping is more effective in dealing with uncontrollable stressors. For example, if at midnight you are stressing over a 40-page paper due in the morning that you have not yet started, you are probably better off recognizing the hopelessness of the situation and doing something to take your mind off it; taking a problem-focused approach by trying to accomplish this task would only lead to frustration, anxiety, and even more stress.

Fortunately, most stressors we encounter can be modified and are, to varying degrees, controllable. A person who cannot stand her job can quit and look for work elsewhere; a middle-aged divorcee can find another potential partner; the freshman who fails an

exam can study harder next time, and a breast lump does not necessarily mean that one is fated to die of breast cancer.

Control and Stress

The desire and ability to predict events, make decisions, and affect outcomes—that is, to enact control in our lives—is a basic tenet of human behavior (Everly & Lating, 2002). Albert Bandura (1997) stated that “the intensity and chronicity of human stress is governed largely by perceived control over the demands of one’s life” (p. 262). As cogently described in his statement, our reaction to potential stressors depends to a large extent on how much control we feel we have over such things. Perceived control is our beliefs about our personal capacity to exert influence over and shape outcomes, and it has major implications for our health and happiness (Infurna & Gerstorf, 2014). Extensive research has demonstrated that perceptions of personal control are associated with a variety of favorable outcomes, such as better physical and mental health and greater psychological well-being (Diehl & Hay, 2010). Greater personal control is also associated with lower reactivity to stressors in daily life. For example, researchers in one investigation found that higher levels of perceived control at one point in time were later associated with lower emotional and physical reactivity to interpersonal stressors (Neupert, Almeida, & Charles, 2007). Further, a daily diary study with 34 older widows found that their stress and anxiety levels were significantly reduced on days during which the widows felt greater perceived control (Ong, Bergeman, & Bisconti, 2005).

Learned Helplessness

When we lack a sense of control over the events in our lives, particularly when those events are threatening, harmful, or noxious, the psychological consequences can be profound. In one of the better illustrations of this concept, psychologist Martin Seligman conducted a series of classic experiments in the 1960s (Seligman & Maier, 1967) in which dogs were placed in a chamber where they received electric shocks from which they could not escape. Later, when these dogs were given the opportunity to escape the shocks by jumping across a partition, most failed to even try; they seemed to just give up and passively accept any shocks the experimenters chose to administer. In comparison, dogs who were previously allowed to escape the shocks tended to jump the partition and escape the pain (Figure).

Seligman's learned helplessness experiments with dogs used an apparatus that measured when the animals would move from a floor delivering shocks to one without.

Seligman believed that the dogs who failed to try to escape the later shocks were demonstrating learned helplessness: They had acquired a belief that they were powerless to do anything about the noxious stimulation they were receiving. Seligman also believed that the passivity and lack of initiative these dogs demonstrated was similar to that observed in human depression. Therefore, Seligman speculated that acquiring a sense of learned helplessness might be an important cause of depression in humans: Humans who experience negative life events that they believe they are unable to control may become helpless. As a result, they give up trying to control or change the situation and some may become depressed and show lack of initiative in future situations in which they can control the outcomes (Seligman, Maier, & Geer, 1968).

Seligman and colleagues later reformulated the original learned helplessness model of depression (Abramson, Seligman, & Teasdale, 1978). In their reformulation, they emphasized attributions (i.e., a mental explanation for why something occurred) that lead to the perception that one lacks control over negative outcomes are important in fostering a sense of learned helplessness. For example, suppose a coworker shows up late to work; your belief as to what caused the coworker's tardiness would be an attribution (e.g., too much traffic, slept too late, or just doesn't care about being on time).

The reformulated version of Seligman's study holds that the attributions made for negative life events contribute to depression. Consider the example of a student who performs poorly on a midterm exam. This model suggests that the student will make

three kinds of attributions for this outcome: internal vs. external (believing the outcome was caused by his own personal inadequacies or by environmental factors), stable vs. unstable (believing the cause can be changed or is permanent), and global vs. specific (believing the outcome is a sign of inadequacy in most everything versus just this area). Assume that the student makes an internal ("I'm just not smart"), stable ("Nothing can be done to change the fact that I'm not smart") and global ("This is another example of how lousy I am at everything") attribution for the poor performance. The reformulated theory predicts that the student would perceive a lack of control over this stressful event and thus be especially prone to developing depression. Indeed, research has demonstrated that people who have a tendency to make internal, global, and stable attributions for bad outcomes tend to develop symptoms of depression when faced with negative life experiences (Peterson & Seligman, 1984).

Seligman's learned helplessness model has emerged over the years as a leading theoretical explanation for the onset of major depressive disorder. When you study psychological disorders, you will learn more about the latest reformulation of this model—now called hopelessness theory.

People who report higher levels of perceived control view their health as controllable, thereby making it more likely that they will better manage their health and engage in behaviors conducive to good health (Bandura, 2004). Not surprisingly, greater perceived control has been linked to lower risk of physical health problems, including declines in physical functioning (Infurna, Gerstorf, Ram, Schupp, & Wagner, 2011), heart attacks (Rosengren et al., 2004), and both cardiovascular disease incidence (Stürmer, Hasselbach, & Amelang, 2006) and mortality from cardiac disease (Surtees et al., 2010). In addition, longitudinal studies of British civil servants have found that those in low-status jobs (e.g., clerical and office support staff) in which the degree of control over the job is minimal are considerably more likely to develop heart disease than those with high-status jobs or considerable control over their jobs (Marmot, Bosma, Hemingway, & Stansfeld, 1997).

The link between perceived control and health may provide an explanation for the frequently observed relationship between social class and health outcomes (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012). In general, research has found that more affluent individuals experience better health mainly because they tend to believe that they can personally control and manage their reactions to life's stressors (Johnson & Krueger, 2006). Perhaps buoyed by the perceived level of control, individuals of higher social class may be prone to overestimating the degree of influence they have over particular outcomes. For example, those of higher social class tend to believe that their votes have greater sway on election outcomes than do those of lower social class, which may explain higher rates of voting in more affluent communities (Krosnick, 1990). Other research has found that a sense of perceived control can protect less affluent individuals from poorer health, depression, and reduced life-satisfaction—all of which tend to accompany lower social standing (Lachman & Weaver, 1998).

Taken together, findings from these and many other studies clearly suggest that perceptions of control and coping abilities are important in managing and coping with the stressors we encounter throughout life.

Social Support

The need to form and maintain strong, stable relationships with others is a powerful, pervasive, and fundamental human motive (Baumeister & Leary, 1995). Building strong interpersonal relationships with others helps us establish a network of close, caring individuals who can provide social support in times of distress, sorrow, and fear. Social support can be thought of as the soothing impact of friends, family, and acquaintances (Baron & Kerr, 2003). Social support can take many forms, including advice, guidance, encouragement, acceptance, emotional comfort, and tangible assistance (such as financial help). Thus, other people can be very comforting to us when we are faced with a wide range of life stressors, and they can be extremely helpful in our efforts to manage these challenges. Even in nonhuman animals, species mates can offer social support during times of stress. For example, elephants seem to be able to sense when other elephants are stressed and will often comfort them with physical contact—such as a trunk touch—or an empathetic vocal response (Krumboltz, 2014).

Scientific interest in the importance of social support first emerged in the 1970s when health researchers developed an interest in the health consequences of being socially integrated (Stroebe & Stroebe, 1996). Interest was further fueled by longitudinal studies showing that social connectedness reduced mortality. In one classic study, nearly 7,000 Alameda County, California, residents were followed over 9 years. Those who had previously indicated that they lacked social and community ties were more likely to die during the follow-up period than those with more extensive social networks. Compared to those with the most social contacts, isolated men and women were, respectively, 2.3 and 2.8 times more likely to die. These trends persisted even after controlling for a variety of health-related variables, such as smoking, alcohol consumption, self-reported health at the beginning of the study, and physical activity (Berkman & Syme, 1979).

Since the time of that study, social support has emerged as one of the well-documented psychosocial factors affecting health outcomes (Uchino, 2009). A statistical review of 148 studies conducted between 1982 and 2007 involving over 300,000 participants concluded that individuals with stronger social relationships have a 50% greater likelihood of survival compared to those with weak or insufficient social relationships (Holt-Lunstad, Smith, & Layton, 2010). According to the researchers, the magnitude of the effect of social support observed in this study is comparable with quitting smoking and exceeded many well-known risk factors for mortality, such as obesity and physical inactivity (Figure).

(a)

(b)

Close relationships with others, whether (a) a group of friends or (b) a family circle, provide more than happiness and fulfillment—they can help foster good health. (credit a: modification of work by Nattachai Noogure; credit b: modification of work by Christian Haugen)

A number of large-scale studies have found that individuals with low levels of social support are at greater risk of mortality, especially from cardiovascular disorders (Brummett et al., 2001). Further, higher levels of social supported have been linked to better survival rates following breast cancer (Falagas et al., 2007) and infectious diseases, especially HIV infection (Lee & Rotheram-Borus, 2001). In fact, a person with high levels of social support is less likely to contract a common cold. In one study, 334 participants completed questionnaires assessing their sociability; these individuals were subsequently exposed to a virus that causes a common cold and monitored for several weeks to see who became ill. Results showed that increased sociability was linearly associated with a decreased probability of developing a cold (Cohen, Doyle, Turner, Alper, & Skoner, 2003).

For many of us, friends are a vital source of social support. But what if you found yourself in a situation in which you lacked friends or companions? For example, suppose a popular high school student attends a far-away college, does not know anyone, and has trouble making friends and meaningful connections with others during the first semester. What can be done? If real life social support is lacking, access to distant friends via social media may help compensate. In a study of college freshmen, those with few face-to-face friends on campus but who communicated electronically with distant friends were less distressed that those who did not (Raney & Troop-Gordon, 2012). Also, for some people, our families—especially our parents—are a major source of social support.

Social support appears to work by boosting the immune system, especially among people who are experiencing stress (Uchino, Vaughn, Carlisle, & Birmingham, 2012). In a pioneering study, spouses of cancer patients who reported high levels of social support showed indications of better immune functioning on two out of three immune functioning measures, compared to spouses who were below the median on reported social support (Baron, Cutrona, Hicklin, Russell, & Lubaroff, 1990). Studies of other

populations have produced similar results, including those of spousal caregivers of dementia sufferers, medical students, elderly adults, and cancer patients (Cohen & Herbert, 1996; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002).

In addition, social support has been shown to reduce blood pressure for people performing stressful tasks, such as giving a speech or performing mental arithmetic (Lepore, 1998). In these kinds of studies, participants are usually asked to perform a stressful task either alone, with a stranger present (who may be either supportive or unsupportive), or with a friend present. Those tested with a friend present generally exhibit lower blood pressure than those tested alone or with a stranger (Fontana, Diegnan, Villeneuve, & Lepore, 1999). In one study, 112 female participants who performed stressful mental arithmetic exhibited lower blood pressure when they received support from a friend rather than a stranger, but only if the friend was a male (Phillips, Gallagher, & Carroll, 2009). Although these findings are somewhat difficult to interpret, the authors mention that it is possible that females feel less supported and more evaluated by other females, particularly females whose opinions they value.

Taken together, the findings above suggest one of the reasons social support is connected to favorable health outcomes is because it has several beneficial physiological effects in stressful situations. However, it is also important to consider the possibility that social support may lead to better health behaviors, such as a healthy diet, exercising, smoking cessation, and cooperation with medical regimens (Uchino, 2009).

Coping with Prejudice and Discrimination

While having social support is quite beneficial, being the recipient of prejudicial attitudes and discriminatory behaviors is associated with a number of negative outcomes. In their literature review, Brondolo, Brady, Pencille, Beatty, and Contrada (2009) describe how racial prejudice and discrimination serve as unique, significant stressors for those who are the targets of such attitudes and behavior. Being the target of racism is associated with increased rates of depression, lowered self-esteem, hypertension, and cardiovascular disease.

Given the complex and pervasive nature of racism as a stressor, Brondolo et al. (2009) point out the importance of coping with this specific stressor. Their review is aimed at determining which coping strategies are most effective at offsetting negative health outcomes associated with racism-related stress. The authors examine the effectiveness of three coping strategies: focusing on racial identity to handle race-related stress, anger expression/suppression, and seeking social support. You've learned a bit about social support, so we'll focus the remainder of this discussion on the potential coping strategies of focusing on racial identity and anger expression/suppression.

Focusing on racial identity refers to the process by which a person comes to feel as if he belongs to a given racial group; this may increase a sense of pride associated with

group membership. Brondolo et al. (2009) suggest that a strong sense of racial identity might help an individual who is the target of racism differentiate between prejudicial attitudes/behaviors that are directed toward his group as a whole rather than at him as a person. Furthermore, the sense of belonging to his group might alleviate the distress of being ostracized by others. However, the research literature on the effectiveness of this technique has produced mixed results.

Anger expression/suppression refers to the options available as a function of the anger evoked by racial prejudice and discrimination. Put simply, a target of racist attitudes and behaviors can act upon her anger or suppress her anger. As discussed by Brondolo et al. (2009), there has been very little research on the effectiveness of either approach; the results are quite mixed with some showing anger expression and others showing anger suppression as the healthier option.

In the end, racism-related stress is a complex issue and each of the coping strategies discussed here has strengths and weaknesses. Brondolo et al. (2009) argue that it is imperative that additional research be conducted to ascertain the most effective strategies for coping with the negative outcomes that are experienced by the targets of racism.

Stress Reduction Techniques

Beyond having a sense of control and establishing social support networks, there are numerous other means by which we can manage stress (Figure). A common technique people use to combat stress is exercise (Salmon, 2001). It is well-established that exercise, both of long (aerobic) and short (anaerobic) duration, is beneficial for both physical and mental health (Everly & Lating, 2002). There is considerable evidence that physically fit individuals are more resistant to the adverse effects of stress and recover more quickly from stress than less physically fit individuals (Cotton, 1990). In a study of more than 500 Swiss police officers and emergency service personnel, increased physical fitness was associated with reduced stress, and regular exercise was reported to protect against stress-related health problems (Gerber, Kellman, Hartman, & Pühse, 2010).

(a) (b) (c)

Stress reduction techniques may include (a) exercise, (b) meditation and relaxation, or (c) biofeedback. (credit a: modification of work by "UNE Photos"/Flickr; credit b: modification of work by Caleb Roenigk; credit c: modification of work by Dr. Carmen Russoniello)

One reason exercise may be beneficial is because it might buffer some of the deleterious physiological mechanisms of stress. One study found rats that exercised for six weeks showed a decrease in hypothalamic-pituitary-adrenal responsiveness to mild stressors (Campeau et al., 2010). In high-stress humans, exercise has been shown to prevent telomere shortening, which may explain the common observation of a youthful appearance among those who exercise regularly (Puterman et al., 2010). Further, exercise in later adulthood appears to minimize the detrimental effects of stress on the hippocampus and memory (Head, Singh, & Bugg, 2012). Among cancer survivors, exercise has been shown to reduce anxiety (Speck, Courneya, Masse, Duval, & Schmitz, 2010) and depressive symptoms (Craft, VanIterson, Helenowski, Rademaker, & Courneya, 2012). Clearly, exercise is a highly effective tool for regulating stress.

In the 1970s, Herbert Benson, a cardiologist, developed a stress reduction method called the relaxation response technique (Greenberg, 2006). The relaxation response technique combines relaxation with transcendental meditation, and consists of four components (Stein, 2001):

1. sitting upright on a comfortable chair with feet on the ground and body in a relaxed position,
2. a quiet environment with eyes closed,
3. repeating a word or a phrase—a mantra—to oneself, such as “alert mind, calm body,”
4. passively allowing the mind to focus on pleasant thoughts, such as nature or the warmth of your blood nourishing your body.

The relaxation response approach is conceptualized as a general approach to stress reduction that reduces sympathetic arousal, and it has been used effectively to treat people with high blood pressure (Benson & Proctor, 1994).

Another technique to combat stress, biofeedback, was developed by Gary Schwartz at Harvard University in the early 1970s. Biofeedback is a technique that uses electronic equipment to accurately measure a person’s neuromuscular and autonomic activity—feedback is provided in the form of visual or auditory signals. The main assumption of this approach is that providing somebody biofeedback will enable the individual to develop strategies that help gain some level of voluntary control over what are normally involuntary bodily processes (Schwartz & Schwartz, 1995). A number of different bodily measures have been used in biofeedback research, including facial muscle movement, brain activity, and skin temperature, and it has been applied successfully with individuals experiencing tension headaches, high blood pressure, asthma, and phobias (Stein, 2001).

Summary

When faced with stress, people must attempt to manage or cope with it. In general, there are two basic forms of coping: problem-focused coping and emotion-focused

coping. Those who use problem-focused coping strategies tend to cope better with stress because these strategies address the source of stress rather than the resulting symptoms. To a large extent, perceived control greatly impacts reaction to stressors and is associated with greater physical and mental well-being. Social support has been demonstrated to be a highly effective buffer against the adverse effects of stress. Extensive research has shown that social support has beneficial physiological effects for people, and it seems to influence immune functioning. However, the beneficial effects of social support may be related to its influence on promoting healthy behaviors.

Review Questions

Emotion-focused coping would likely be a better method than problem-focused coping for dealing with which of the following stressors?

a. terminal cancer
b. poor grades in school
c. unemployment
d. divorce

Studies of British civil servants have found that those in the lowest status jobs are much more likely to develop heart disease than those who have high status jobs. These findings attest to the importance of _____ in dealing with stress.

a. biofeedback
b. social support
c. perceived control
d. emotion-focused coping

Relative to those with low levels of social support, individuals with high levels of social support _____.

a. are more likely to develop asthma
b. tend to have less perceived control
c. are more likely to develop cardiovascular disorders
d. tend to tolerate stress well

The concept of learned helplessness was formulated by Seligman to explain the _____.

a. inability of dogs to attempt to escape avoidable shocks after having received inescapable shocks
b. failure of dogs to learn to from prior mistakes
c. ability of dogs to learn to help other dogs escape situations in which they are receiving uncontrollable shocks
d. inability of dogs to learn to help other dogs escape situations in which they are receiving uncontrollable electric shocks

Critical Thinking Questions

Although problem-focused coping seems to be a more effective strategy when dealing with stressors, do you think there are any kinds of stressful situations in which emotion-focused coping might be a better strategy?

Describe how social support can affect health both directly and indirectly.

Personal Application Question

Try to think of an example in which you coped with a particular stressor by using problem-focused coping. What was the stressor? What did your problem-focused efforts involve? Were they effective?

Glossary

Biofeedback- Stress-reduction technique using electronic equipment to measure a person's involuntary (neuromuscular and autonomic) activity and provide feedback to help the person gain a level of voluntary control over these processes

Coping- Mental or behavioral efforts used to manage problems relating to stress, including its cause and the unpleasant feelings and emotions it produces

Perceived control- Peoples' beliefs concerning their capacity to influence and shape outcomes in their lives

Relaxation response technique- Stress reduction technique combining elements of relaxation and meditation

Social support- Soothing and often beneficial support of others; can take different forms, such as advice, guidance, encouragement, acceptance, emotional comfort, and tangible assistance.

Cool Down

Now that you are done reading the chapter, you need to select a cool down strategy—specifically one that is most likely to prepare you for a multiple choice exam. After reading the strategies below, decide which one is best to use. If you think combining the strategies is the best idea, then you can do so. Below, describe which after reading strategy makes the most sense for you.

Strategy 1: **The Summarizer**	After you finish reading a section or your textbook or a chapter in a book, make it into a neat package by summarizing it. Look through the chapter section for key words. They might be terms, but they might also be words that show how terms are related. Once you have written down key words, put those words in a few sentences that you write in your own words—close the book when you do this. Once you're finished, open it up again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Key words:

	Summary without looking at the book: Summary after looking at the book and making changes:

Strategy 2: Test Buster	If you could guess what the question on the test will be, you'd have no trouble getting an "A." Find out what kind of questions you will be asked on the exam. Multiple choice? Fill-in-the blank? Short answer? Essay? Will it be open book? Know how many questions there will be, and how many points the test will be worth. Once you know all that, you will be a great position to make good, educated guesses about what the questions on the test will be. After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.

Academic Skill: Focus on Discussion

Warm up for a Discussion

You are going to have discussion over the “Stress and Lifestyles” chapter in class. By now, you have finished reading the chapter and have taken notes over the entire thing. This is what your instructor tells you about the discussion:

“The next time class meets, we will have a discussion about the relationship between stress and health.” You learned in chapter one that there are three basic types of discussions. Here are the descriptions of those discussions again:

Concept Check Discussion- The purpose of concept check discussions is to give students opportunities to practice discussing challenging concepts. The act of putting unfamiliar terms and concepts into your own words causes you to clarify your thinking and deepen your understanding. Listening to someone else describe a concept is less likely to lead to deep understanding than having to talk about it yourself. Think about it like this— if you want to learn to swim, you must actually swim. You can learn a little bit by listening to someone talk about swimming, or watching other people swim, but you really cannot learn to swim until you put on a bathing suit and jump in the water.

Task Focused Discussion—The purpose of a task focused discussion is to complete a task—usually one that will help you with an upcoming test or assignment. Sometimes, task focused discussions are with the whole class, but sometimes the instructor will break the class up into small groups. An instructor might ask you to brainstorm topics for an upcoming paper, or think up examples to illustrate an important concept. He or she might ask you to summarize a reading, pick out main ideas or develop a time-line that will help you understand an important process or a significant series of events. In a math or science class, you might be asked to solve a mathematical problem.

Evaluation Discussion- An evaluation discussion focuses on evaluating another student’s work. Students are often particularly hostile to evaluation discussion because they feel they are grading one another’s work—which is the instructor’s job, not theirs. They may think, “I barely understand this myself, why should I have to comment on someone else’s work?” They may say “Only the instructor’s opinion matters since that is where my grade comes from. Who cares what my classmates, who are as clueless as me, think?” However, your instructor sees evaluation discussions very differently. You may be asked to read and comment on one another’s essays, or you may be asked to compare and contrast how you approached a specific problem or question. Usually, the purpose of an evaluation discussion is to help students develop judgment about what is and is not effective work. Usually, this means applying ideas you have learned in the class about effective writing, problem solving, etc. to that student’s work.

Based on what you know of the discussion topic, which kind of discussion do you think your instructor likely has in mind? What makes you say that?

If you said “Concept Check Discussion,” you are likely correct. Your instructor, because she said she wants to discuss the relationship between stress and health, likely would like you to clearly understand how stress impacts health.

Now that you know your instructor’s goals, how can you best prepare for this discussion? Re-read “Warming Up for Discussion” in chapter one if you need to refresh your memory about ways to prepare for a lecture. Write your ideas below:

Work out During a Discussion

On the day of the discussion, come to class and immediately open both your book and your notebook to the parts that relate to health and stress. Get out a pen. Set goals for yourself for the discussion. Those goals might include:

- Asking questions about concepts or terms you find confusing
- Taking an opportunity to practice defining a term or concept in your own words
- Providing examples of how stress impacts health—either examples from your own life, examples you read in the text book or ones you thought up yourself.
- Adding to your notes if a classmate or your instructor gives a particularly helpful example or a particularly clear definition. You might also add to your notes if the class discusses something you did not write down at all, or that seems to be important.

Cool Down after a Discussion

After the discussion, ask yourself this question:

“What did my instructor want us to get out of today’s discussion?”

Here are a few conclusions you can safely draw:

If your instructor devoted an hour of class time to this discussion, the concepts must be important for you to understand. If that is true, they must be important for a reason. Usually, your instructor will use discussion time to emphasize concepts that will be on the exam, or that you will have to write a paper over. Therefore, it is safe to conclude that you will have to answer questions on the connection between stress and health on your exam.

Academic Skill: Focus on Lecture

You have just practiced the warm up, work out and cool down strategies for reading. Now, you will apply the same ideas to a lecture.

Warm up to Listen to a Lecture

The name of this lecture is “How to Make Stress Your Friend.” You have just finished reading a psychology chapter that certainly seemed to make the case that stress is an enemy—it causes everything from a weakened immune system to heart problems. Now, this lecture seems to make a very different point.

Part 1.

Usually, the lectures you will hear in class do not have titles, but this one does. Use it to get clues about what you will hear. Based just on the title, brainstorm what this lecture might be about before you even listen to it.

Part 2.

Finally, make sure you have the right equipment and are ready to go. Make sure you have a notebook and a pen or pencil ready. Remember that sometimes pens run out of ink and pencils grow dull, so make sure you have a spare. If you have a highlighter, have it handy so you can highlight important ideas.

Make sure you write the title of the lecture across the top of your page and put today’s date.

Work Out during Lecture

In chapter 1, you learned about several techniques to take notes successfully during a lecture. Here are those suggestions again:

Abbreviate

Most classes have jargon you can abbreviate. In an American Government class, for example, the word “Government” will be used a great deal. In an Earth Science class, long words like “environment” or “Photosynthesis” might be used regularly. Abbreviate them—“gov,” “env” and “PhSyn” will be much easier for you to write quickly. If you are worried you will forget what your abbreviations mean, make a glossary at the top of your page.

Abbreviate common concepts. For examples, the instructor may say that something has increased or decreased, improved, or gotten worse etc. Use an arrow up or an arrow down to represent that idea. You can the arrow up or down in any class.

Use mathematical symbols to represent ideas like “added,” or “lost,” “divided” or “multiplied.” For example the concept:

“The Governor needed five more Congress members’ votes in order to pass the bill” might show up like this in your notes:

“Gov need 5 + cong member to pass bill.”

Pay Attention to Numbers

Listen for Phrases that Help You Set Goals

Most instructors provide some direction for students about what they will cover in a lecture. Often this happens at the beginning of class (So make sure you arrive at class on time, notebook and pen ready!)

Listen for phrases like:

> “Today we are going to talk about . . . “
>
> “We are going to discuss the reasons why _____ happened.”
>
> “There are five kinds of . . . .”
>
> “It is important for you to understand . . . “
>
> “_____ is significant because . . . .”

Phrases like this help you understand what the goal of a lecture is. If your instructor says “The Civil Rights Movement had five significant effects on public policy” that means you need to end class knowing those five effects—you can make sure your notes reflect that.

Listen for Transitions

Most instructors give you some warning when they are about to move on to another topic. Learn to pay attention to how your instructors transition. Here are some clues:

Some will stop a lecture and ask if there are questions about what he/she just said. Often, that is a cue that he/she is moving on to another topic.

Others will cue the class by saying something like “The second important point . . . .” This tells you that the instructor is moving on. In your notes, write “2nd important point . . .”

Sometimes instructors will “change gears” by warning you that something is different than something else. For example, if a Biology teacher is talking about deciduous trees and wants to shift to talking about evergreen trees, she might say something like, “Evergreen trees are different from deciduous trees in several important ways . . . .” In your notes, write something like “Evergreen diff from decid trees ‘cuz .. . .”

Make a Plan

Now that you have read the suggestions again, decide which two you would like to try to use today and write those up at the top of your page.

Or click on the link below or copy it into your browser.

https://www.ted.com/talks/kelly_mcgonigal_how_to_make_stress_your_friend

When you are ready, watch the lecture.

While you are watching it, do your best to use the two suggestions you settled on. If you fall behind, don’t worry—this is practice, and, since it is a recorded lecture, you can stop and rewind. Do your best.

Cool Down

Working with the Notes

Once you are done listening to the lecture, go back over your notes and fill in additional information that you remember but did not get a chance to write down. Next, try one of the following suggestions you learned about in chapter one in the Cool Down section.

- Create an "index." After the lecture is over, jot down a few words about the subject of that day's notes. Put it under the date that you put across the top of the page. Something like "Reasons the Civil War Started" will be fine. When you review notes later, you can scan the subjects to find the notes you need.

- As you know, textbooks often have important terms bolded. You can do the same thing. Use a highlighter to mark important terms. Make sure your notes have definitions of terms that make sense to you. If they don't, add to the definition by drawing an arrow and writing in the margin.

- As you also know, textbooks often use bullet lists, headings and subheadings. Use a different colored pen and/or highlighters to go back to your notes and make your own headings and subheadings. For example, if you instructor is lecturing over the five major outcomes of the Civil Rights movement, go back to your notes and write (in the margins if you have to) "Five major outcomes of Civil Rights Movement." Next, number each reason so you can clearly see them. If you seem to be short a reason or two, visit your instructor or talk to classmate to see what you missed.

- Tab your notes. As you get closer to a big exam or paper, make tabs for your notes. You can buy tabs at office supply stores or make your own out of tape and colored paper. The tabs will run alongside the edge of the notes and will divide your notes up by subject. If you are taking an American History class, one tab might say "Revolutionary War." Another might say "Civil War" etc.

After you have completed your cool down activity, switch notes with a classmate to see how your notes are different from his or hers.

When you are done with all of that, go back and watch the lecture again. Take a different color pen and jot down the information that you missed the first time through. Pay attention to how much information you did get down the first time you heard the lecture and notice how much more information you are adding the second time.

What Type of Lecture is this?

In Chapter one, you learned that lectures can relate to the text book in one of three ways. Below are the descriptions of those relationships. Read them again and decide what relationship you think the lecture "How to Make Stress Your Friend" has with the textbook chapter.

Hand-in-Hand lectures: These lectures are right over the material in the books. They are called hand-in-hand since they "walk" side by side with the book—what you read about in the books for the courses is the same material you are hearing about in lecture. Usually, your instructor will give "hand in hand" lectures because he or she believes the material in the book is either

difficult and needs further explanation or because the information is REALLY important for you to learn and your instructor wants to do everything possible to make sure it makes sense to you.

Jumping off Point lectures: these lectures “jump off” from the book material. They bring in materials you cannot read about in the book—they may expand on ideas in the book or provide examples of concepts in the book. Usually, instructors who give “jumping off point” lectures believe that students can be responsible for reading the book and learning from it. Instead, they feel it is their job to use their expertise to provide you with information that you cannot learn from the book. Sometimes, an instructor is aware of new research that has been done in a field and they want to supplement what is in the book with new, updated information. They believe the information in the book is a foundation that their lectures will build from. They also believe you are responsible for the material they provide you in lecture and may well choose to test you on it.

Combination lectures: Some instructors will combine both Hand-in-hand and Jumping off point lectures. Others will use one type of lecture for some chapters in a semester and another type for other chapters.

Which of the three options above do you think best describes the relationship between the lecture and the text book chapter? Explain your answer.

Academic Skill: Focus on Writing

The following article addresses the particular kinds of stress that college students might experience.

http://college.usatoday.com/2015/10/29/college-student-stress/

After you are done reading the article, consider your life as a college student. Has stress affected your academic performance? Are you one of the students mentioned in the article who is overwhelmed by the amount of work that goes into being a college student? The chapter, the article and the TED Talk all discuss ways for you to cope with stress.

In an academic essay, summarize the USA today article. Then, explain how you connect to the article by describing your own experience with stress as a college student. Finally, select one or two suggestions about how to cope with stress from either the TED talk, the chapter or the article that you think would be particularly helpful for you as you work to manage your stress. Explain why you believe that particular stress management idea would work well for you.

Work with your instructor to develop a thesis statement, and determine how many paragraphs this paper is likely to be. The chart below lists the parts of an academic essay.

	Activity
Warm-up	To warm up your brain, carefully read the prompt. Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself “If a stranger were to read my paper over my shoulder, would it make sense?”

It might help you write academic essays once you know that all academic essays have qualities in common. Once you understand that, it is much easier to decide how to approach a paper assignment. Think of the graphic below as a “paper map.” The boxes represent paragraphs and the descriptions will tell you what the general goals are for each paragraph. Dotted lines represent the different parts of a paragraph. The “paper map” shows you the parts of an academic essay in the order they should appear in your paper. In other words, the thesis statement should be at the end of the introductory paragraph. When you write an academic essay, you need to follow the “rules” of academic essay writing just like, when you play a sport, you need to follow the rules of the game.

Structure for an Academic Essay

Introduction Your introductory paragraph will have two main parts.	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs Each body paragraph	*Part 1: Topic Sentence*- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.

will have three parts.	*Part 2: Evidence*- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.
	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence should be taken seriously.

Conclusion Your conclusion will have two parts.	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

Warm up for Writing

Before you actually begin to write your paper, there are three things to consider that will help you decide how to approach your paper.

1. What were you told to do? Make sure to carefully read the prompt you were given. Does it give you information about what the instructor wants?
2. What are your goals?

3. What are your preferences? If the prompt does not provide you with information about what strategy to use, and several strategies might help you achieve your goal, then you can choose the goal that work best for you.

Working Out while Writing a Paper

The charts below describe the strategies you might use in three parts of your paper—the establishing authority part of the introduction, the evidence part of the body paragraph and the evaluation part of the body paragraph. Your job will be to select the strategies that are most likely to help you achieve your goal.

Strategies for Establishing Authority *Remember, the goal of establishing authority is to provide the reader with the information they need to understand your paper and prove to them that you are worth listening to. The following strategies will help you do that.*	
Summary	If you are responding to an essay, a video, a lecture or a book, you might choose to summarize its main ideas. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your

	paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

The chart below lists different strategies you can choose from when you present evidence in your body paragraphs. Notice that many of the strategies are the same ones you can use to establish authority.

Strategies for Presenting Evidence *Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.*	
Summary	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your

	paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.
Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

The chart below lists the strategies you can use when you evaluate your body paragraph. Remember, EACH body paragraph needs it's own evaluation. The strategies below are possible ways you can evaluate your paragraph.

Strategies for Evaluating Your Paragraph *Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.*	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?
How is the information presented in the	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to

evidence part of the paragraph related?	explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else changed as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the "Structure of an Academic Essay" graphic and go through your paper section by section. Do you establish authority? Do you have a thesis statement where it belongs? Do you have a topic sentence for each body paragraph? Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructor's expectations.

Eventually, your instructor will read your rough draft and provide comments for you. You will then have to revise. It is not uncommon for students to re-write papers five or six times before "getting it right." Be patient with the revision process!

Chapter 3: Happiness

	Purpose
Warm-up	Your brain actually remembers information better if it warms up. You warm up your brain by preparing it for the academic activity that it must do. If you are preparing for a discussion, for example, you can ask yourself, "Why is my instructor going to have a discussion? What do they hope I will 'get out' of this discussion?"
Work out	In academics, the purpose of the workout is to learn the material you need to know in order to be successful in the class. This might involve reading, jotting down ideas you might wish to share in discussion, or taking notes on a lecture.
Cool Down	In academics, the purpose of a cool down is to do two things—one, make some decisions about what you did during your workout that is important enough to remember and two, plan ahead. What will you need to study tomorrow? What confuses you and how can you get help with your confusion?

Warm Up:

What makes you happy? Define happiness. How happy are you? Is it important to be happy? If so, why? If not, why not?

Academic Skill: Focus on Lecture

In order to prepare to read the articles in this chapter, you will be listening to several lectures first.

Warm up to Listen to a Lecture

Usually, the lectures you will hear in class do not have titles, but this one does. Use it to get clues about what you will hear. Based just on the title, brainstorm what this lecture might be about before you even listen to it.

Finally, make sure you have the right equipment and are ready to go. Make sure you have a notebook and a pen or pencil ready. Remember that sometimes pens run out of ink and pencils grow dull, so make sure you have a spare. If you have a highlighter, have it handy so you can highlight important ideas.

Make sure you write the title of the lecture across the top of your page and put today's date.

Work Out during Lecture

In chapter 1, you learned about several techniques to take notes successfully during a lecture. Here are those suggestions again:

Abbreviate

Most classes have jargon you can abbreviate. In an American Government class, for example, the word "Government" will be used a great deal. In an Earth Science class, long words like "environment" or "Photosynthesis" might be used regularly. Abbreviate them—"gov," "env" and

“PhSyn” will be much easier for you to write quickly. If you are worried you will forget what your abbreviations mean, make a glossary at the top of your page.

Abbreviate common concepts. For examples, the instructor may say that something has increased or decreased, improved, or gotten worse etc. Use an arrow up or an arrow down to represent that idea. You can the arrow up or down in any class.

Use mathematical symbols to represent ideas like “added,” or “lost,” “divided” or “multiplied.” For example the concept:

“The Governor needed five more Congress members’ votes in order to pass the bill” might show up like this in your notes:

“Gov need 5 + cong member to pass bill.”

Pay Attention to Numbers

Listen for Phrases that Help You Set Goals

Most instructors provide some direction for students about what they will cover in a lecture. Often this happens at the beginning of class (So make sure you arrive at class on time, notebook and pen ready!)

Listen for phrases like:

> “Today we are going to talk about . . . “
>
> “We are going to discuss the reasons why _____ happened.”
>
> “There are five kinds of . . . .”
>
> “It is important for you to understand . . . “
>
> “_____ is significant because . . . .”

Phrases like this help you understand what the goal of a lecture is. If your instructor says “The Civil Rights Movement had five significant effects on public policy” that means you need to end class knowing those five effects—you can make sure your notes reflect that.

Listen for Transitions

Most instructors give you some warning when they are about to move on to another topic. Learn to pay attention to how your instructors transition. Here are some clues:

Some will stop a lecture and ask if there are questions about what he/she just said. Often, that is a cue that he/she is moving on to another topic.

Others will cue the class by saying something like “The second important point . . . .” This tells you that the instructor is moving on. In your notes, write “2nd important point . . .”

Sometimes instructors will “change gears” by warning you that something is different than something else. For example, if a Biology teacher is talking about deciduous trees and wants to shift to talking about evergreen trees, she might say something like, “Evergreen trees are

different from deciduous trees in several important ways . . . .” In your notes, write something like “Evergreen diff from decid trees ‘cuz .. . .”

Make a Plan

Now that you have read the suggestions again, decide which two you would like to try to use today and write those up at the top of your page.

When you are ready, watch the lecture.

While you are watching it, do your best to use the two suggestions you settled on. If you fall behind, don’t worry—this is practice, and, since it is a recorded lecture, you can stop and rewind. Do your best.

Listening Activities

Listen to the following lectures from Ted.com.

Using the Notetaking Strategies, take notes on the following lectures.

You may also copy and paste the URL into your web browser to listen to the lectures from Ted.com.

https://www.ted.com/talks/dan_gilbert_asks_why_are_we_happy

https://www.ted.com/talks/nic_marks_the_happy_planet_index

https://www.ted.com/talks/matthieu_ricard_on_the_habits_of_happiness

https://www.ted.com/talks/chip_conley_measuring_what_makes_life_worthwhile

https://www.ted.com/talks/daniele_quercia_happy_maps

https://www.ted.com/talks/shawn_achor_the_happy_secret_to_better_work

Cool Down from Listening to a Lecture

Working with the Notes

Once you are done listening to the lecture, go back over your notes and fill in additional information that you remember but did not get a chance to write down. Next, try one of the following suggestions you learned about in chapter one in the Cool Down section.

- Create an "index." After the lecture is over, jot down a few words about the subject of that day's notes. Put it under the date that you put across the top of the page. Something like "Reasons the Civil War Started" will be fine. When you review notes later, you can scan the subjects to find the notes you need.

- As you know, textbooks often have important terms bolded. You can do the same thing. Use a highlighter to mark important terms. Make sure your notes have definitions of terms that make sense to you. If they don't, add to the definition by drawing an arrow and writing in the margin.

- As you also know, textbooks often use bullet lists, headings and subheadings. Use a different colored pen and/or highlighters to go back to your notes and make your own

headings and subheadings. For example, if you instructor is lecturing over the five major outcomes of the Civil Rights movement, go back to your notes and write (in the margins if you have to) “Five major outcomes of Civil Rights Movement.” Next, number each reason so you can clearly see them. If you seem to be short a reason or two, visit your instructor or talk to classmate to see what you missed.

- Tab your notes. As you get closer to a big exam or paper, make tabs for your notes. You can buy tabs at office supply stores or make your own out of tape and colored paper. The tabs will run alongside the edge of the notes and will divide your notes up by subject. If you are taking an American History class, one tab might say “Revolutionary War.” Another might say “Civil War” etc.

After you have completed your cool down activity, switch notes with a classmate to see how your notes are different from his or hers.

When you are done with all of that, go back and watch the lecture again. Take a different color pen and jot down the information that you missed the first time through. Pay attention to how much information you did get down the first time you heard the lecture and notice how much more information you are adding the second time.

What Type of Lecture is this?

In Chapter one, you learned that lectures can relate to the text book in one of three ways. Once you’ve finished reading the articles in this chapter, come back to your notes to decide what kind of lectures these are.

Hand-in-Hand lectures: These lectures are right over the material in the books. They are called hand-in-hand since they “walk” side by side with the book—what you read about in the books for the courses is the same material you are hearing about in lecture. Usually, your instructor will give “hand in hand” lectures because he or she believes the material in the book is either difficult and needs further explanation or because the information is REALLY important for you to learn and your instructor wants to do everything possible to make sure it makes sense to you.

Jumping off Point lectures: these lectures “jump off” from the book material. They bring in materials you cannot read about in the book—they may expand on ideas in the book or provide examples of concepts in the book. Usually, instructors who give “jumping off point” lectures believe that students can be responsible for reading the book and learning from it. Instead, they feel it is their job to use their expertise to provide you with information that you cannot learn from the book. Sometimes, an instructor is aware of new research that has been done in a field and they want to supplement what is in the book with new, updated information. They believe the information in the book is a foundation that their lectures will build from. They also believe you

are responsible for the material they provide you in lecture and may well choose to test you on it.

Combination lectures: Some instructors will combine both Hand-in-hand and Jumping off point lectures. Others will use one type of lecture for some chapters in a semester and another type for other chapters.

Which of the three options above do you think best describes the relationship between the lecture and the text book chapter? Explain your answer.

Academic Skill: Focus on Reading

As a reminder, here is the overview again of the process you can use to read the articles in this chapter.

	Activity
Warm-up	To warm up your brain, spend a few minutes looking over the material you need to read. Read the headings and subheadings. Look at graphics and pictures if there are any. Ask yourself "What will I be learning in this reading?" "What ideas seem to be important?"
Work out	To work out in reading, you need to read! But it isn't that simple. You need to have a note taking strategy that will allow you to do two things: 1) Figure out what information is most important and 2) Remember that information.
Cool Down	To cool down in reading, see what you can remember about the reading by stating main ideas in your own words, telling a friend what you learned or asking yourself "Which ideas did I read tonight are so important they might end up on an exam?" You can also make a list of things that confused you that you can ask your instructor or a tutor.

Your instructor or tutor will help you decide which strategies to use for what type of reading. However, there are three things to take into consideration about any textbook, article or essay you read that will help you select a good strategy. They are:

1) *Structure*- The very first thing to consider about your reading is how it is structured. Does the author seem to be comparing and contrasting two or more people, ideas, places, processes or events? Does the author seem to be describing how a process such as passing a law, photosynthesis or the evaporation cycle happens? Does the author seem

to be defining important terms or concepts? Your instructor will help you notice how your textbook chapters or other reading are organized, and once you have figured out the author's goals, it is time to consider Purpose.

2) *Purpose*- the second thing to consider about anything you read is what is YOUR purpose for reading the material? Will you have to write a paper over it? Participate in a class discussion? Take a multiple choice test over it? Take an essay test over it? What you will have DO with the information you read should help you determine what strategies you should use to get the most out of your reading. Again, your instructor or tutor will help you think through what strategies will be the most effective ones to use to achieve your purpose.

3) *Preferences*- The final thing to consider is your preferences. Once you have determined the structure of the reading and thought through the purpose, the last factor you can weigh in is how you would like to take notes—which strategies are the most effective for you? Which ones seem to fit your learning style the best? The more experience you have using strategies, the stronger your preferences will become.

Warm up to Reading

The three strategies described below should be used before you actually read. You might wish to do just one strategy, or it might make sense to use more than one.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There questions about studying in a group if you join a study or tutor group. **What do I need to know when I finish reading?** Will I taking a test? ____ Will I be writing an essay? ____

	Will I participating in a discussion? ____ **Group Information (if you're in a group to read this chapter)** This group will meet again on _____. By then, I will need to read ___ pages and ___ sections. **Time Management** *Date_____ Time I began reading_____ Time I ended_____ # of pages completed_____

Pre-Reading Strategy 2: The Foundation Builder	Lay a good foundation for your reading by examine the headings, the subheadings, and the graphs in the entire chapter. Headings tell you what the chapter will be about, which prepares your mind and helps you read more efficiently. Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer	Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from

	those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Reading Activity #1

Use the Pre-Reading Strategies for the following article:

You can click on this link or copy and paste it into a browser.

https://greatergood.berkeley.edu/article/item/happiness_the_hard_way

Work out while Reading

Once you have finished the Pre-Reading strategies, take some time to use the During Reading Strategies as you read the above article.

Strategy 1: **Connector**	As you read new sections of this article, you need to relate the new information you are learning to what you have already read. **How does this section fit into the book?** How does this section connect to the previous section? Introduces a topic that: ➢ Supports the big main idea ➢ Describes another step in a process you are learning

	➢ Describes events in the order in which they occur ➢ Other:_____ **How does section this relate to the lecture?** Does this article expand on ideas from the lectures? Are there places in both where the speakers and writer agree with each other? Do they disagree?

Strategy 2: **Illustrator**	Are you learning about a process or are you learning about events as they happened? Make a timeline. Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3: **Note taker**	In this class, you will learn a variety of notetaking strategies. They might include matrix notes, graphic organizers, Cornell notes, outline style and others. If you feel that one of these

	note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section. Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

Cool Down after Reading

Take some time to complete the After Reading Strategies on this same article now.

Strategy 1: **The Summarizer**	After you finish reading this article, make it into a neat package by summarizing it. Look through the article for key words. Once you have written down key words, put those words in a few sentences that you write in your own words. Don't look at the article while you're doing this.

	Once you're finished, look at it again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Write a summary without looking at the article: Write a summary after looking at the article and making changes.

Strategy 2: Test Buster	If you could guess what the question on the test will be, you'd have no trouble getting an "A." Find out what kind of questions you will be asked on the exam. Multiple choice? Fill-in-the blank? Short answer? Essay? Will it be open book? Know how many questions there will be, and how many points the test will be worth. Once you know all that, you will be a great position to make good, educated guesses about what the questions on the test will be. After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.

Reading Activity #2

Use the 'warm up, work out, and cool down' strategies to read the following article.

https://greatergood.berkeley.edu/article/item/happy_life_different_from_meaningful_life

Reading Activity #3:

Use the ‘warm up, work out, and cool down’ strategies to read the following article.

https://greatergood.berkeley.edu/article/item/four_ways_happiness_can_hurt_you

Academic Skill: Focus on Writing Academic Essays

Critical Essay:

1. Combine the main ideas and supporting points of the three articles you just read into a summary.
2. Combine your annotations into a reflection response to the article.
3. Analyze the arguments in each. What should a person do to achieve happiness?

A good college writer warms up, works out, then cools down. Here is how that process applies to writing college-level papers:

	Activity
Warm-up	To warm up your brain, carefully read the prompt. Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself "If a stranger were to read my paper over my shoulder, would it make sense?"

It might help you write academic essays once you know that all academic essays have qualities in common. Once you understand that, it is much easier to decide how to approach a paper assignment. Think of the graphic below as a "paper map." The boxes represent paragraphs and the descriptions will tell you what the general goals are for each paragraph. Dotted lines

represent the different parts of a paragraph. The “paper map” shows you the parts of an academic essay in the order they should appear in your paper. In other words, the thesis statement should be at the end of the introductory paragraph. When you write an academic essay, you need to follow the “rules” of academic essay writing just like, when you play a sport, you need to follow the rules of the game.

Structure for an Academic Essay

Introduction Your introductory paragraph will have two main parts.	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs Each body paragraph will have three parts.	*Part 1: Topic Sentenc*e- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.
	Part 2: Evidence- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.
	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence should be taken seriously.

Conclusion Your conclusion will have two parts.	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

Warm up for Writing

Before you actually begin to write your paper, there are three things to consider that will help you decide how to approach your paper.

What were you told to do? Make sure to carefully read the prompt you were given. Does it give you information about what the instructor wants?

What are your goals?

What are your preferences? If the prompt does not provide you with information about what strategy to use, and several strategies might help you achieve your goal, then you can choose the goal that work best for you.

Working Out while Writing a Paper

The charts below describe the strategies you might use in three parts of your paper—the establishing authority part of the introduction, the evidence part of the body paragraph and the evaluation part of the body paragraph. Your job will be to select the strategies that are most likely to help you achieve your goal.

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Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

The chart below lists different strategies you can choose from when you present evidence in your body paragraphs. Notice that many of the strategies are the same ones you can use to establish authority.

Strategies for Presenting Evidence Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.	
	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in

Summary	the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.
Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

The chart below lists the strategies you can use when you evaluate your body paragraph. Remember, EACH body paragraph needs it's own evaluation. The strategies below are possible ways you can evaluate your paragraph.

Strategies for Evaluating Your Paragraph

Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following

strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?
How is the information presented in the evidence part of the paragraph related?	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else changed as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the "Structure of an Academic Essay" graphic and go through your paper section by section. Do you establish authority? Do you have a thesis statement where it belongs? Do you have a topic sentence for each body paragraph? Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructor's expectations.

Eventually, your instructor will read your rough draft and provide comments for you. You will then have to revise. It is not uncommon for students to re-write papers five or six times before "getting it right." Be patient with the revision process!

Chapter 4: Biology

	Purpose
Warm-up	Your brain actually remembers information better if it warms up. You warm up your brain by preparing it for the academic activity that it must do. If you are preparing for a discussion, for example, you can ask yourself, "Why is my instructor going to have a discussion? What do they hope I will 'get out' of this discussion?"
Work out	In academics, the purpose of the workout is to learn the material you need to know in order to be successful in the class. This might involve reading, jotting down ideas you might wish to share in discussion, or taking notes on a lecture.
Cool Down	In academics, the purpose of a cool down is to do two things—one, make some decisions about what you did during your workout that is important enough to remember and two, plan ahead. What will you need to study tomorrow? What confuses you and how can you get help with your confusion?

Warm Up:

What is my instructor going to ask me to do? What do they hope I will 'get out' of this chapter and unit?" Read the Review Questions at the end of Chapter 1 The Study of Life. What do you need to know by the time you finish reading this chapter?

Academic Skill: Focus on Reading

A good college reader warms up, works out then cools down. Here is how that process applies to reading college level material:

	Activity
Warm-up	To warm up your brain, spend a few minutes looking over the material you need to read. Read the headings and subheadings. Look at graphics and pictures if there are any. Ask yourself "What will I be learning in this reading?" "What ideas seem to be important?"
Work out	To work out in reading, you need to read! But it isn't that simple. You need to have a note taking strategy that will allow you to do two things: 1) Figure out what information is most important and 2) Remember that information.
Cool Down	To cool down in reading, see what you can remember about the reading by stating main ideas in your own words, telling a friend what you learned or asking yourself "Which ideas did I read tonight are so important they might end up on an exam?" You can also make a list of things that confused you that you can ask your instructor or a tutor.

Warm up

The three strategies described below should be used before you actually read. You might wish to do just one strategy, or it might make sense to use more than one.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There

	questions about studying in a group if you join a study or tutor group. Chapter Information The test over this material is on _____. How many pages will I have to read each day to complete the reading before the test? _____ How many sections are there in this chapter? _____ Group Information (If you're meeting in a group.) This group will meet again on _____. By then, I will need to read ___ pages and ___ sections. Time Management *Date_____ Time I began reading_____ Time I ended_____ # of pages completed_____ *Use this information to calculate how long it will take you to complete the chapter so you can make an accurate schedule.

Pre-Reading Strategy 2: The Foundation Builder	Lay a good foundation for your reading by examine the headings, the subheadings, and the graphs in the entire chapter. Headings tell you what the chapter will be about, which prepares your mind and helps you read more efficiently.

	Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer	It is important to know where you've been before you move on to somewhere new. You have about 24 hours to review information you learned when you study before you forget it forever. Here is a technique for reviewing book notes: Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Work out

While you are reading, you can't simply run your eyes over the words and expect to retain anything anymore than you can expect to sit quietly in the corner at a choir rehearsal and learn the songs. While you read, you need to have a way to interact with the material so you can remember it.

Strategy 1: **Connector**	As you read new sections of your text book or book you need to relate the new information you are learning to what you have already read. How does this section fit into the book?

	How does this section connect to the previous section? Introduces a topic that: Supports the big main idea Describes another step in a process you are learning Describes events in the order in which they occur Other:_____ How does section this relate to the lecture? Does the lecture expand on ideas brought up in the book? Does the lecture cover different materials altogether? Does the lecture go over the book directly?

Strategy 2: **Illustrator**	Your job is to use pictures or graphs to represent the ideas in this section of your textbook. It is best if the graphic you pick will help you see the relationships between the different ideas you must learn. Are you learning about a process or are you learning about events as they happened? Make a timeline. Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3:	

Note taker	In this class, you will learn a variety of notetaking strategies. They might include matrix notes, graphic organizers, Cornell notes, outline style and others. If you feel that one of these note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section. Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

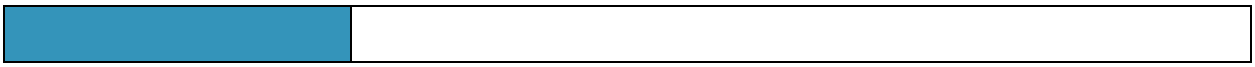
Cool down

Many students make the mistake of completing the read they have to do for a particular day, closing the book and moving on to the next task. This is like the athlete who leaves practice before the cool down! In addition to risking injury to her muscles, this athlete also misses the end of practice conversations about what the team is doing well and what practices will emphasize in the future. Students need to have a cool down to make sure they understand what they read that day and to think about what some good ways are to study in the days to come.

Strategy 1: **The Summarizer**	After you finish reading a section or your textbook or a chapter in a book, make it into a neat package by summarizing it. Look through the chapter section for key words. They might be terms, but they might also be words that show how terms are related. Once you have written down key words, put those words

	in a few sentences that you write in your own words—close the book when you do this. Once you're finished, open it up again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Key words: Summary without looking at the book: Summary after looking at the book and making changes:

Strategy 2: Test Buster	If you could guess what the question on the test will be, you'd have no trouble getting an "A." Find out what kind of questions you will be asked on the exam. Multiple choice? Fill-in-the blank? Short answer? Essay? Will it be open book? Know how many questions there will be, and how many points the test will be worth. Once you know all that, you will be a great position to make good, educated guesses about what the questions on the test will be. After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.



Reading: THE STUDY OF LIFE

Figure 1.1 *This NASA image is a composite of several satellite-based views of Earth. To make the whole-Earth image, NASA scientists combine observations of different parts of the planet. (credit: NASA/GSFC/NOAA/USGS)*

Chapter Outline

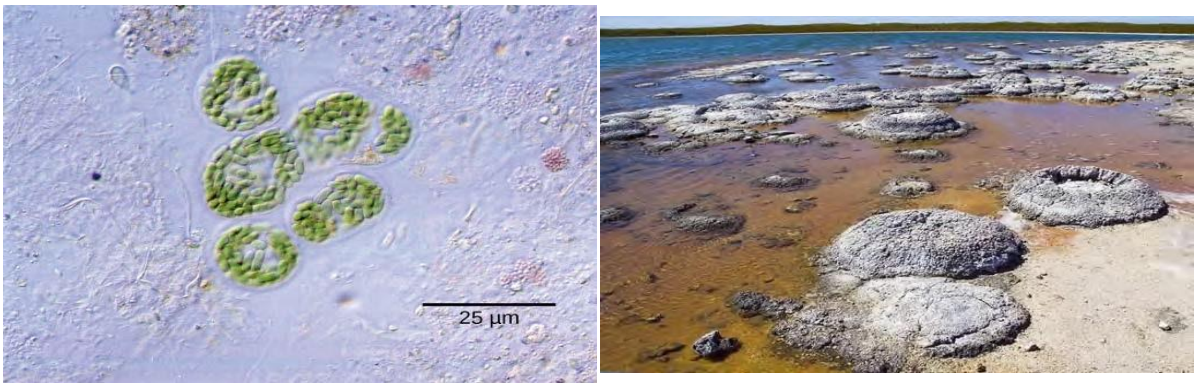
Introduction

Viewed from space, Earth offers no clues about the diversity of life forms that reside there. The first forms of life on Earth are thought to have been microorganisms that existed for billions of years in the ocean before plants and animals appeared. The mammals, birds, and flowers so familiar to us are all relatively recent, originating 130 to 200 million years ago. Humans have inhabited this planet for only the last 2.5 million years, and only in the last 200,000 years have humans started looking like we do today.

1.1 | The Science of Biology

By the end of this section, you will be able to:

- Identify the shared characteristics of the natural sciences
- Summarize the steps of the scientific method
- Compare inductive reasoning with deductive reasoning
- Describe the goals of basic science and applied science



(a) (b)

Figure 1.2 *Formerly called blue-green algae, these (a) cyanobacteria, shown here at 300x magnification under a light microscope, are some of Earth's oldest life forms. These (b) stromatolites along the shores of Lake Thetis in Western Australia are ancient structures formed by the layering of cyanobacteria in shallow waters. (credit a: modification of work by NASA; credit b: modification of work by Ruth Ellison; scale-bar data from Matt Russell)*

What is biology? In simple terms, **biology** is the study of living organisms and their interactions with one another and their environments. This is a very broad definition because the scope of biology is vast. Biologists may study anything from the microscopic or submicroscopic view of a cell to ecosystems and the whole living planet (**Figure 1.2**). Listening to the daily news, you will quickly realize how many aspects of biology are discussed every day. For example, recent news topics include *Escherichia coli* (**Figure 1.3**) outbreaks in spinach and *Salmonella* contamination in peanut butter. Other subjects include efforts toward finding a cure for AIDS, Alzheimer's disease, and cancer. On a global scale, many researchers are committed to finding ways to protect the planet, solve environmental issues, and reduce the effects of climate change. All of these diverse endeavors are related to different facets of the discipline of biology.

Figure 1.3 *Escherichia coli (E. coli) bacteria, seen in this scanning electron micrograph, are normal residents of our digestive tracts that aid in the absorption of vitamin K and other nutrients. However, virulent strains are sometimes responsible for disease outbreaks. (credit: Eric Erbe, digital colorization by Christopher Pooley, both of USDA, ARS, EMU)*

The Process of Science

Biology is a science, but what exactly is science? What does the study of biology share with other scientific disciplines? **Science** (from the Latin *scientia*, meaning “knowledge”) can be defined as knowledge that covers general truths or the operation of general laws, especially when acquired and tested by the scientific method. It becomes clear from this definition that the application of the scientific method plays a major role in science. The **scientific method** is a method of research with defined steps that include experiments and careful observation.

The steps of the scientific method will be examined in detail later, but one of the most important aspects of this method is the testing of hypotheses by means of repeatable experiments. A **hypothesis** is a suggested explanation for an event, which can be tested. Although using the scientific method is inherent to science, it is inadequate in determining what science is. This is because it is relatively easy to apply the scientific method to disciplines such as physics and chemistry, but when it comes to disciplines like archaeology, psychology, and geology, the scientific method becomes less applicable as it becomes more difficult to repeat experiments.

These areas of study are still sciences, however. Consider archeology—even though one cannot perform repeatable experiments, hypotheses may still be supported. For instance, an archeologist can hypothesize that an ancient culture existed based on finding a piece of pottery. Further hypotheses could be made about various characteristics of this culture, and these hypotheses may be found to be correct or false through continued support or contradictions from other findings. A hypothesis may become a verified theory. A **theory** is a tested and confirmed explanation for observations or phenomena. Science may be better defined as fields of study that attempt to comprehend the nature of the universe.

Natural Sciences

What would you expect to see in a museum of natural sciences? Frogs? Plants? Dinosaur skeletons? Exhibits about how the brain functions? A planetarium? Gems and minerals? Or, maybe all of the above? Science includes such diverse fields as astronomy, biology, computer sciences, geology, logic, physics, chemistry, and mathematics (**Figure 1.4**). However, those fields of science related to the physical world and its phenomena and processes are considered **natural sciences**. Thus, a museum of natural sciences might contain any of the items listed above.

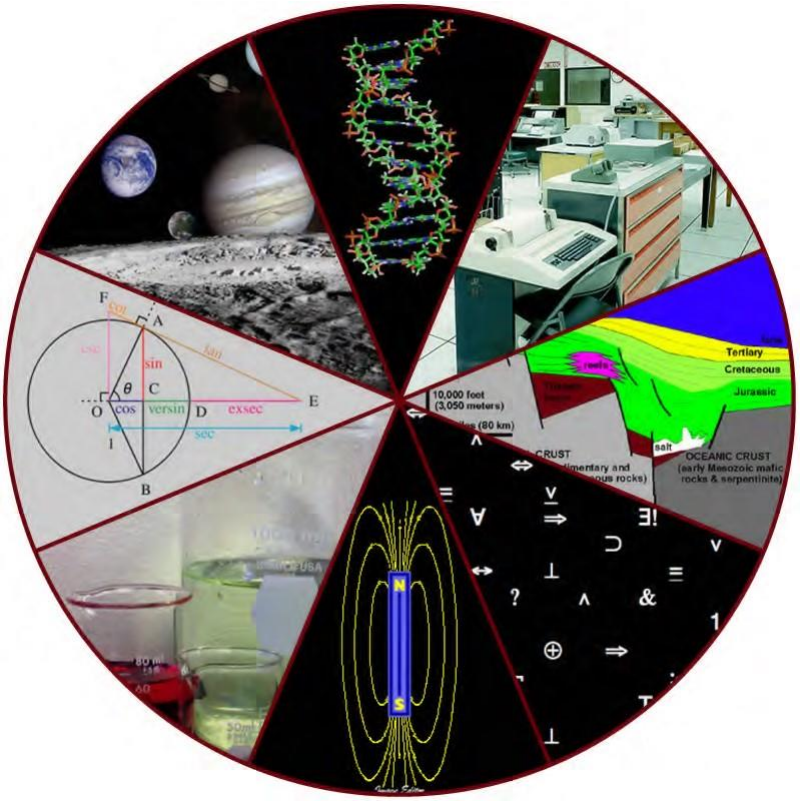


Figure 1.4 *The diversity of scientific fields includes astronomy, biology, computer science, geology, logic, physics, chemistry, mathematics, and many other fields. (credit: "Image Editor"/Flickr)*

There is no complete agreement when it comes to defining what the natural sciences include, however. For some experts, the natural sciences are astronomy, biology, chemistry, earth science, and physics. Other scholars choose to divide natural sciences into **life sciences**, which study living things and include biology, and **physical sciences**, which study nonliving matter and include astronomy, geology, physics, and chemistry. Some disciplines such as biophysics and biochemistry build on both life and physical sciences and are interdisciplinary. Natural sciences are sometimes referred to as "hard science" because they rely on the use of quantitative data; social sciences that study society and human behavior are more likely to use qualitative assessments to drive investigations and findings.

Not surprisingly, the natural science of biology has many branches or subdisciplines. Cell biologists study cell structure and function, while biologists who study anatomy investigate the structure of an entire organism. Those biologists studying physiology, however, focus on the internal functioning of an organism. Some areas of biology focus on only particular types of living things. For example, botanists explore plants, while zoologists specialize in animals.

Scientific Reasoning

One thing is common to all forms of science: an ultimate goal “to know.” Curiosity and inquiry are the driving forces for the development of science. Scientists seek to understand the world and the way it operates. To do this, they use two methods of logical thinking: inductive reasoning and deductive reasoning.

Inductive reasoning is a form of logical thinking that uses related observations to arrive at a general conclusion. This type of reasoning is common in descriptive science. A life scientist such as a biologist makes observations and records them. These data can be qualitative or quantitative, and the raw data can be supplemented with drawings, pictures, photos, or videos. From many observations, the scientist can infer conclusions (inductions) based on evidence. Inductive reasoning involves formulating generalizations inferred from careful observation and the analysis of a large amount of data. Brain studies provide an example. In this type of research, many live brains are observed while people are doing a specific activity, such as viewing images of food. The part of the brain that “lights up” during this activity is then predicted to be the part controlling the response to the selected stimulus, in this case, images of food. The “lighting up” of the various areas of the brain is caused by excess absorption of radioactive sugar derivatives by active areas of the brain. The resultant increase in radioactivity is observed by a scanner. Then, researchers can stimulate that part of the brain to see if similar responses result.

Deductive reasoning or deduction is the type of logic used in hypothesis-based science. In deductive reason, the pattern of thinking moves in the opposite direction as compared to inductive reasoning. **Deductive reasoning** is a form of logical thinking that uses a general principle or law to forecast specific results. From those general principles, a scientist can extrapolate and predict the specific results that would be valid as long as the general principles are valid. Studies in climate change can illustrate this type of reasoning. For example, scientists may predict that if the climate becomes warmer in a particular region, then the distribution of plants and animals should change. These predictions have been made and tested, and many such changes have been found, such as the modification of arable areas for agriculture, with change based on temperature averages.

Both types of logical thinking are related to the two main pathways of scientific study: descriptive science and hypothesis-based science. **Descriptive (or discovery) science**, which is usually

inductive, aims to observe, explore, and discover, while **hypothesis-based science**, which is usually deductive, begins with a specific question or problem and a potential answer or solution that can be tested. The boundary between these two forms of study is often blurred, and most scientific endeavors combine both approaches. The fuzzy boundary becomes apparent when thinking about how easily observation can lead to specific questions. For example, a gentleman in the 1940s observed that the burr seeds that stuck to his clothes and his dog's fur had a tiny hook structure. On closer inspection, he discovered that the burrs' gripping device was more reliable than a zipper. He eventually developed a company and produced the hook-and-loop fastener popularly known today as Velcro. Descriptive science and hypothesis-based science are in continuous dialogue.

The Scientific Method

Biologists study the living world by posing questions about it and seeking science-based responses. This approach is common to other sciences as well and is often referred to as the scientific method. The scientific method was used even in ancient times, but it was first documented by England's Sir Francis Bacon (1561–1626) (**Figure 1.5**), who set up inductive methods for scientific inquiry. The scientific method is not exclusively used by biologists but can be applied to almost all fields of study as a logical, rational problem-solving method.

Figure 1.5 *Sir Francis Bacon (1561–1626) is credited with being the first to define the scientific method. (credit: Paul van Somer)*

The scientific process typically starts with an observation (often a problem to be solved) that leads to a question. Let's think about a simple problem that starts with an observation and apply the scientific method to solve the problem. One Monday morning, a student arrives at class and quickly discovers that the classroom is too warm. That is an observation that also describes a

problem: the classroom is too warm. The student then asks a question: “Why is the classroom so warm?”

Proposing a Hypothesis

Recall that a hypothesis is a suggested explanation that can be tested. To solve a problem, several hypotheses may be proposed. For example, one hypothesis might be, “The classroom is warm because no one turned on the air conditioning.” But there could be other responses to the question, and therefore other hypotheses may be proposed. A second hypothesis might be, “The classroom is warm because there is a power failure, and so the air conditioning doesn’t work.”

Once a hypothesis has been selected, the student can make a prediction. A prediction is similar to a hypothesis but it typically has the format “If . . . then . . . .” For example, the prediction for the first hypothesis might be, “*If* the student turns on the air conditioning, *then* the classroom will no longer be too warm.”

Testing a Hypothesis

A valid hypothesis must be testable. It should also be **falsifiable**, meaning that it can be disproven by experimental results. Importantly, science does not claim to “prove” anything because scientific understandings are always subject to modification with further information. This step—openness to disproving ideas—is what distinguishes sciences from non-sciences. The presence of the supernatural, for instance, is neither testable nor falsifiable. To test a hypothesis, a researcher will conduct one or more experiments designed to eliminate one or more of the hypotheses. Each experiment will have one or more variables and one or more controls. A **variable** is any part of the experiment that can vary or change during the experiment. The **control group** contains every feature of the experimental group except it is not given the manipulation that is hypothesized about. Therefore, if the results of the experimental group differ from the control group, the difference must be due to the hypothesized manipulation, rather than some outside factor. Look for the variables and controls in the examples that follow. To test the first hypothesis, the student would find out if the air conditioning is on. If the air conditioning is turned on but does not work, there should be another reason, and this hypothesis should be rejected. To test the second hypothesis, the student could check if the lights in the classroom are functional. If so, there is no power failure and this hypothesis should be rejected. Each hypothesis should be tested by carrying out appropriate experiments. Be aware that rejecting one hypothesis does not determine whether or not the other hypotheses can be accepted; it simply eliminates one hypothesis that is not valid (**Figure 1.6**). Using the scientific method, the hypotheses that are inconsistent with experimental data are rejected.

While this “warm classroom” example is based on observational results, other hypotheses and experiments might have clearer controls. For instance, a student might attend class on Monday

and realize she had difficulty concentrating on the lecture. One observation to explain this occurrence might be, “When I eat breakfast before class, I am better able to pay attention.” The student could then design an experiment with a control to test this hypothesis.

In hypothesis-based science, specific results are predicted from a general premise. This type of reasoning is called deductive reasoning: deduction proceeds from the general to the particular. But the reverse of the process is also possible: sometimes, scientists reach a general conclusion from a number of specific observations. This type of reasoning is called inductive reasoning, and it proceeds from the particular to the general. Inductive and deductive reasoning are often used in tandem to advance scientific knowledge (**Figure 1.7**).

art CONNECTION

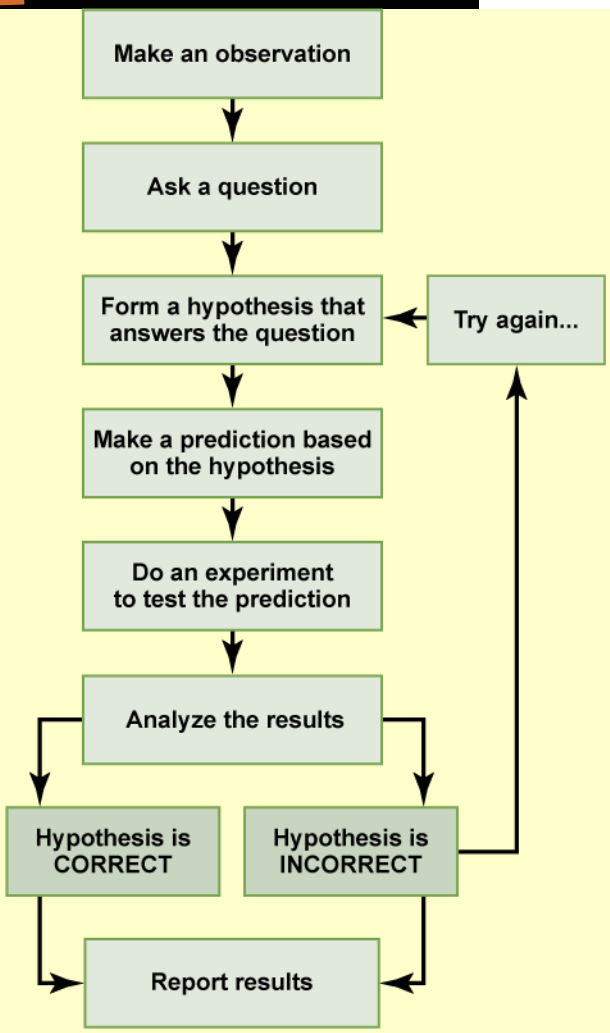


Figure 1.6 The scientific method consists of a series of well-defined steps. If a hypothesis is not supported by experimental data, a new hypothesis can be proposed.

In the example below, the scientific method is used to solve an everyday problem. Order the scientific method steps (numbered items) with the process of solving the everyday problem (lettered items). Based on the results of the experiment, is the hypothesis correct? If it is incorrect, propose some alternative hypotheses.

1. Observation
2. Question
3. Hypothesis (answer)
4. Prediction
5. Experiment
6. Result

a. There is something wrong with the electrical outlet.
b. If something is wrong with the outlet, my coffeemaker also won't work when plugged into it.
c. My toaster doesn't toast my bread.
d. I plug my coffee maker into the outlet.
e. My coffeemaker works.
f. Why doesn't my toaster work?

art CONNECTION

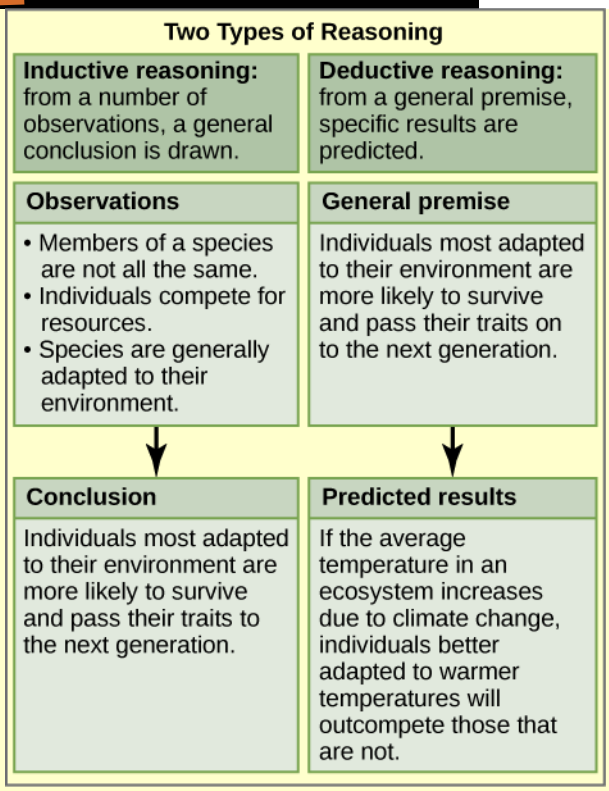


Figure 1.7 Scientists use two types of reasoning, inductive and deductive reasoning, to advance scientific knowledge. As is the case in this example, the conclusion from inductive reasoning can often become the premise for inductive reasoning.

Decide if each of the following is an example of inductive or deductive reasoning.

1. All flying birds and insects have wings. Birds and insects flap their wings as they move through the air. Therefore, wings enable flight.
2. Insects generally survive mild winters better than harsh ones. Therefore, insect pests will become more problematic if global temperatures increase.
3. Chromosomes, the carriers of DNA, separate into daughter cells during cell division. Therefore, DNA is the genetic material.
4. Animals as diverse as humans, insects, and wolves all exhibit social behavior. Therefore, social behavior must have an evolutionary advantage.

The scientific method may seem too rigid and structured. It is important to keep in mind that, although scientists often follow this sequence, there is flexibility. Sometimes an experiment leads to conclusions that favor a change in approach; often, an experiment brings entirely new scientific questions to the puzzle. Many times, science does not operate in a linear fashion; instead, scientists continually draw inferences and make generalizations, finding patterns as their research proceeds. Scientific reasoning is more complex than the scientific method alone suggests. Notice, too, that the scientific method can be applied to solving problems that aren't necessarily scientific in nature.

Two Types of Science: Basic Science and Applied Science

The scientific community has been debating for the last few decades about the value of different types of science. Is it valuable to pursue science for the sake of simply gaining knowledge, or does scientific knowledge only have worth if we can apply it to solving a specific problem or to bettering our lives? This question focuses on the differences between two types of science: basic science and applied science.

Basic science or "pure" science seeks to expand knowledge regardless of the short-term application of that knowledge. It is not focused on developing a product or a service of immediate public or commercial value. The immediate goal of basic science is knowledge for knowledge's sake, though this does not mean that, in the end, it may not result in a practical application.

In contrast, **applied science** or "technology," aims to use science to solve real-world problems, making it possible, for example, to improve a crop yield, find a cure for a particular disease, or save animals threatened by a natural disaster (**Figure 1.8**). In applied science, the problem is usually defined for the researcher.

Figure 1.8 *After Hurricane Ike struck the Gulf Coast in 2008, the U.S. Fish and Wildlife Service rescued this brown pelican. Thanks to applied science, scientists knew how to rehabilitate the bird. (credit: FEMA)*

Some individuals may perceive applied science as "useful" and basic science as "useless." A question these people might pose to a scientist advocating knowledge acquisition would be, "What for?" A careful look at the history of science, however, reveals that basic knowledge has resulted in many remarkable applications of great value. Many scientists think that a basic understanding of science is necessary before an application is developed; therefore, applied science relies on the results generated through basic science. Other scientists think that it is time to move on from basic science and instead to find solutions to actual problems. Both approaches are valid. It is true that there are problems that demand immediate attention; however, few solutions would be found without the help of the wide knowledge foundation generated through basic science.

One example of how basic and applied science can work together to solve practical problems occurred after the discovery of DNA structure led to an understanding of the molecular mechanisms governing DNA replication. Strands of DNA, unique in every human, are found in our cells, where they provide the instructions necessary for life. During DNA replication, DNA makes new copies of itself, shortly before a cell divides. Understanding the mechanisms of DNA replication enabled scientists to develop laboratory techniques that are now used to identify genetic diseases, pinpoint individuals who were at a crime scene, and determine paternity. Without basic science, it is unlikely that applied science would exist.

Another example of the link between basic and applied research is the Human Genome Project, a study in which each human chromosome was analyzed and mapped to determine the precise sequence of DNA subunits and the exact location of each gene. (The gene is the basic unit of heredity; an individual's complete collection of genes is his or her genome.) Other less complex organisms have also been studied as part of this project in order to gain a better understanding of human chromosomes. The Human Genome Project (**Figure 1.9**) relied on basic research carried out with simple organisms and, later, with the human genome. An important end goal eventually became using the data for applied research, seeking cures and early diagnoses for genetically related diseases.

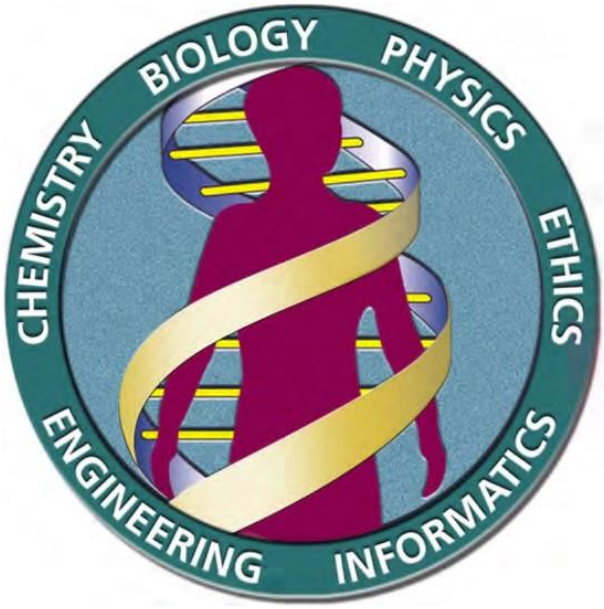


Figure 1.9 *The Human Genome Project was a 13-year collaborative effort among researchers working in several different fields of science. The project, which sequenced the entire human genome, was completed in 2003. (credit: the U.S. Department of Energy Genome Programs (http://genomics.energy.gov))*

While research efforts in both basic science and applied science are usually carefully planned, it is important to note that some discoveries are made by **serendipity**, that is, by means of a fortunate accident or a lucky surprise. Penicillin was discovered when biologist Alexander Fleming accidentally left a petri dish of *Staphylococcus* bacteria open. An unwanted mold grew

on the dish, killing the bacteria. The mold turned out to be *Penicillium*, and a new antibiotic was discovered. Even in the highly organized world of science, luck—when combined with an observant, curious mind—can lead to unexpected breakthroughs.

Reporting Scientific Work

Whether scientific research is basic science or applied science, scientists must share their findings in order for other researchers to expand and build upon their discoveries. Collaboration with other scientists—when planning, conducting, and analyzing results—are all important for scientific research. For this reason, important aspects of a scientist's work are communicating with peers and disseminating results to peers. Scientists can share results by presenting them at a scientific meeting or conference, but this approach can reach only the select few who are present. Instead, most scientists present their results in peer-reviewed manuscripts that are published in scientific journals. **Peer-reviewed manuscripts** are scientific papers that are reviewed by a scientist's colleagues, or peers. These colleagues are qualified individuals, often experts in the same research area, who judge whether or not the scientist's work is suitable for publication. The process of peer review helps to ensure that the research described in a scientific paper or grant proposal is original, significant, logical, and thorough. Grant proposals, which are requests for research funding, are also subject to peer review. Scientists publish their work so other scientists can reproduce their experiments under similar or different conditions to expand on the findings. The experimental results must be consistent with the findings of other scientists.

A scientific paper is very different from creative writing. Although creativity is required to design experiments, there are fixed guidelines when it comes to presenting scientific results. First, scientific writing must be brief, concise, and accurate. A scientific paper needs to be succinct but detailed enough to allow peers to reproduce the experiments.

The scientific paper consists of several specific sections—introduction, materials and methods, results, and discussion. This structure is sometimes called the "IMRaD" format. There are usually acknowledgment and reference sections as well as an **abstract** (a concise summary) at the beginning of the paper. There might be additional sections depending on the type of paper and the journal where it will be published; for example, some review papers require an outline.

The **introduction** starts with brief, but broad, background information about what is known in the field. A good introduction also gives the rationale of the work; it justifies the work carried out and also briefly mentions the end of the paper, where the hypothesis or research question driving the research will be presented. The introduction refers to the published scientific work of others and therefore requires citations following the style of the journal. Using the work or ideas of others without proper citation is considered **plagiarism**.

The **materials and methods** section includes a complete and accurate description of the substances used, and the method and techniques used by the researchers to gather data. The

description should be thorough enough to allow another researcher to repeat the experiment and obtain similar results, but it does not have to be verbose. This section will also include information on how measurements were made and what types of calculations and statistical analyses were used to examine raw data. Although the materials and methods section gives an accurate description of the experiments, it does not discuss them.

Some journals require a results section followed by a discussion section, but it is more common to combine both. If the journal does not allow the combination of both sections, the **results** section simply narrates the findings without any further interpretation. The results are presented by means of tables or graphs, but no duplicate information should be presented. In the **discussion** section, the researcher will interpret the results, describe how variables may be related, and attempt to explain the observations. It is indispensable to conduct an extensive literature search to put the results in the context of previously published scientific research. Therefore, proper citations are included in this section as well.

Finally, the **conclusion** section summarizes the importance of the experimental findings. While the scientific paper almost certainly answered one or more scientific questions that were stated, any good research should lead to more questions. Therefore, a well-done scientific paper leaves doors open for the researcher and others to continue and expand on the findings.

Review articles do not follow the IMRAD format because they do not present original scientific findings, or primary literature; instead, they summarize and comment on findings that were published as primary literature and typically include extensive reference sections.

1.2 | Themes and Concepts of Biology

By the end of this section, you will be able to:

- Identify and describe the properties of life
- Describe the levels of organization among living things
- Recognize and interpret a phylogenetic tree
- List examples of different sub disciplines in biology

Biology is the science that studies life, but what exactly is life? This may sound like a silly question with an obvious response, but it is not always easy to define life. For example, a branch of biology called virology studies viruses, which exhibit some of the characteristics of living entities but lack others. It turns out that although viruses can attack living organisms, cause diseases, and even reproduce, they do not meet the criteria that biologists use to define life. Consequently, virologists are not biologists, strictly speaking. Similarly, some biologists study the early molecular evolution that gave rise to life; since the events that preceded life are not biological events, these scientists are also excluded from biology in the strict sense of the term.

From its earliest beginnings, biology has wrestled with three questions: What are the shared properties that make something “alive”? And once we know something is alive, how do we find meaningful levels of organization in its structure? And, finally, when faced with the remarkable diversity of life, how do we organize the different kinds of organisms so that we can better understand them? As new organisms are discovered every day, biologists continue to seek answers to these and other questions.

Properties of Life

All living organisms share several key characteristics or functions: order, sensitivity or response to the environment, reproduction, growth and development, regulation, homeostasis, and energy processing. When viewed together, these eight characteristics serve to define life.

Order

Figure 1.10 *A toad represents a highly organized structure consisting of cells, tissues, organs, and organ systems. (credit: “Ivengo”/Wikimedia Commons)*

Organisms are highly organized, coordinated structures that consist of one or more cells. Even very simple, single-celled organisms are remarkably complex: inside each cell, atoms make up molecules; these in turn make up cell organelles and other cellular inclusions. In multicellular organisms (**Figure 1.10**), similar cells form tissues. Tissues, in turn, collaborate to create organs (body structures with a distinct function). Organs work together to form organ systems.

Sensitivity or Response to Stimuli

Figure 1.11 *The leaves of this sensitive plant (Mimosa pudica) will instantly droop and fold when touched. After a few minutes, the plant returns to normal. (credit: Alex Lomas)*

Organisms respond to diverse stimuli. For example, plants can grow toward a source of light, climb on fences and walls, or respond to touch (**Figure 1.11**). Even tiny bacteria can move toward or away from chemicals (a process called *chemotaxis*) or light (*phototaxis*). Movement toward a stimulus is considered a positive response, while movement away from a stimulus is considered a negative response.

Watch **this video (http://openstaxcollege.org/l/movement_plants)** to see how plants respond to a stimulus—from opening to light, to wrapping a tendril around a branch, to capturing prey.

Reproduction

Single-celled organisms reproduce by first duplicating their DNA, and then dividing it equally as the cell prepares to divide to form two new cells. Multicellular organisms often produce specialized reproductive germline cells that will form new individuals. When reproduction occurs, genes containing DNA are passed along to an organism's offspring. These genes ensure that the offspring will belong to the same species and will have similar characteristics, such as size and shape.

Growth and Development

All organisms grow and develop following specific instructions coded for by their genes. These genes provide instructions that will direct cellular growth and development, ensuring that a species' young (**Figure 1.12**) will grow up to exhibit many of the same characteristics as its parents.

Figure 1.12 *Although no two look alike, these kittens have inherited genes from both parents and share many of the same characteristics. (credit: Rocky Mountain Feline Rescue)*

Regulation

Even the smallest organisms are complex and require multiple regulatory mechanisms to coordinate internal functions, respond to stimuli, and cope with environmental stresses. Two examples of internal functions regulated in an organism are nutrient transport and blood flow. Organs (groups of tissues working together) perform specific functions, such as carrying oxygen throughout the body, removing wastes, delivering nutrients to every cell, and cooling the body.

Homeostasis

Figure 1.13 *Polar bears (Ursus maritimus) and other mammals living in ice-covered regions maintain their body temperature by generating heat and reducing heat loss through thick fur and a dense layer of fat under their skin. (credit: "longhorndave"/Flickr)*

In order to function properly, cells need to have appropriate conditions such as proper temperature, pH, and appropriate concentration of diverse chemicals. These conditions may, however, change from one moment to the next. Organisms are able to maintain internal conditions within a narrow range almost constantly, despite environmental changes, through **homeostasis** (literally, "steady state")—the ability of an organism to maintain constant internal conditions. For example, an organism needs to regulate body temperature through a process known as thermoregulation. Organisms that live in cold climates, such as the polar bear (**Figure 1.13**), have body structures that help them withstand low temperatures and conserve body heat. Structures that aid in this type of insulation include fur, feathers, blubber, and fat. In hot

climates, organisms have methods (such as perspiration in humans or panting in dogs) that help them to shed excess body heat.

Energy Processing

Figure 1.14 *The California condor (Gymnogyps californianus) uses chemical energy derived from food to power flight. California condors are an endangered species; this bird has a wing tag that helps biologists identify the individual. (credit: Pacific Southwest Region U.S. Fish and Wildlife Service)*

All organisms use a source of energy for their metabolic activities. Some organisms capture energy from the sun and convert it into chemical energy in food; others use chemical energy in molecules they take in as food (**Figure 1.14**).

Levels of Organization of Living Things

Living things are highly organized and structured, following a hierarchy that can be examined on a scale from small to large. The **atom** is the smallest and most fundamental unit of matter. It consists of a nucleus surrounded by electrons. Atoms form molecules. A **molecule** is a chemical structure consisting of at least two atoms held together by one or more chemical bonds. Many molecules that are biologically important are **macromolecules**, large molecules that are typically formed by polymerization (a polymer is a large molecule that is made by combining smaller units called monomers, which are simpler than macromolecules). An example of a macromolecule is deoxyribonucleic acid (DNA) (**Figure 1.15**), which contains the instructions for the structure and functioning of all living organisms.

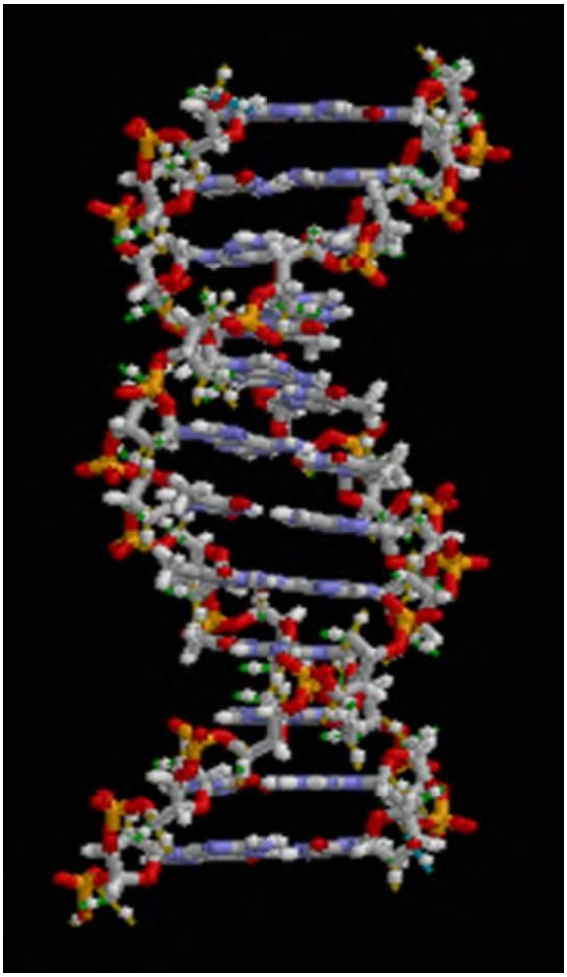


Figure 1.15 All molecules, including this DNA molecule, are composed of atoms. (credit: “brian0918”/Wikimedia Commons)

Watch **this video (http://openstaxcollege.org/l/rotating_DNA)** that animates the three-dimensional structure of the DNA molecule shown in **Figure 1.15**.

Some cells contain aggregates of macromolecules surrounded by membranes; these are called **organelles**. Organelles are small structures that exist within cells. Examples of organelles include mitochondria and chloroplasts, which carry out indispensable functions: mitochondria produce energy to power the cell, while chloroplasts enable green plants to utilize the energy in sunlight to make sugars. All living things are made of cells; the **cell** itself is the smallest fundamental unit of structure and function in living organisms. (This requirement is why viruses are not considered living: they are not made of cells. To make new viruses, they have to invade and hijack the reproductive mechanism of a living cell; only then can they obtain the materials they need to reproduce.) Some organisms consist of a single cell and others are multicellular. Cells are classified as prokaryotic or eukaryotic. **Prokaryotes** are single-celled or colonial organisms that do not have membrane-bound nuclei; in contrast, the cells of **eukaryotes** do have membrane-bound organelles and a membrane-bound nucleus.

In larger organisms, cells combine to make **tissues**, which are groups of similar cells carrying out similar or related functions. **Organs** are collections of tissues grouped together performing a common function. Organs are present not only in animals but also in plants. An **organ system** is a higher level of organization that consists of functionally related organs. Mammals have many organ systems. For instance, the circulatory system transports blood through the body and to and from the lungs; it includes organs such as the heart and blood vessels. **Organisms** are individual living entities. For example, each tree in a forest is an organism. Single-celled prokaryotes and single-celled eukaryotes are also considered organisms and are typically referred to as microorganisms.

All the individuals of a species living within a specific area are collectively called a **population**. For example, a forest may include many pine trees. All of these pine trees represent the population of pine trees in this forest. Different populations may live in the same specific area. For example, the forest with the pine trees includes populations of flowering plants and also insects and microbial populations. A **community** is the sum of populations inhabiting a particular area. For instance, all of the trees, flowers, insects, and other populations in a forest form the forest's community. The forest itself is an ecosystem. An **ecosystem** consists of all the living things in a particular area together with the abiotic, non-living parts of that environment such as nitrogen in the soil or rain water. At the highest level of organization (**Figure 1.16**), the **biosphere** is the collection of all ecosystems, and it represents the zones of life on earth. It includes land, water, and even the atmosphere to a certain extent.

art CONNECTION

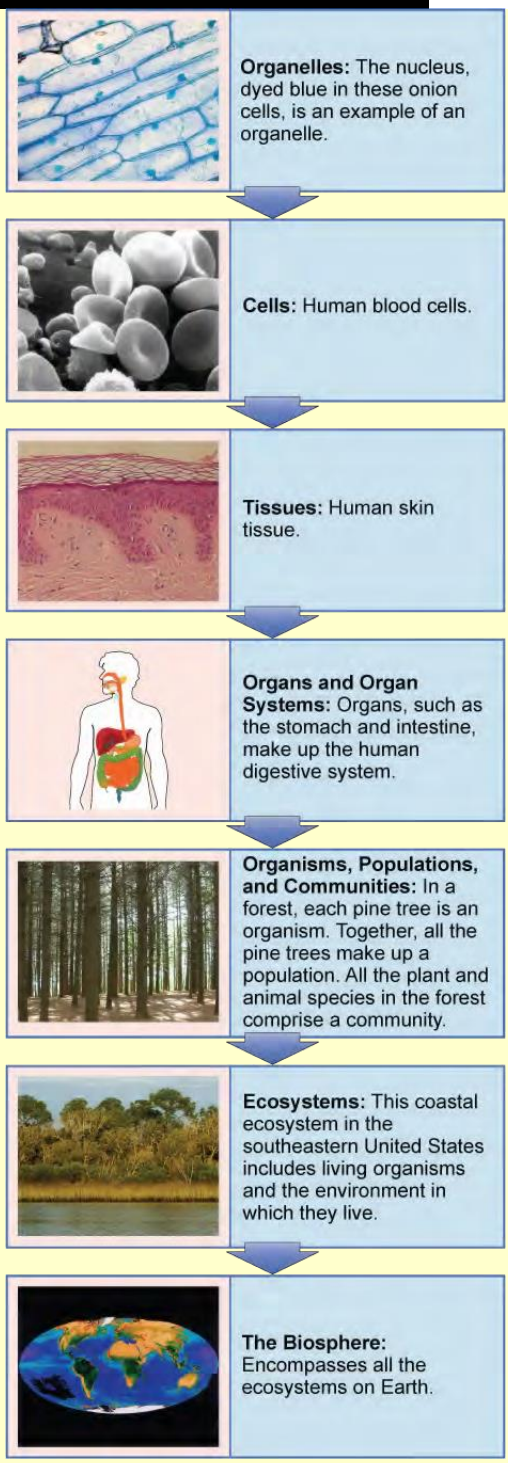


Figure 1.16 The biological levels of organization of living things are shown. From a single organelle to the entire biosphere, living organisms are parts of a highly structured hierarchy. (credit "organelles": modification of work by Umberto Salvagnin; credit "cells": modification of work by Bruce Wetzel, Harry Schaefer/ National Cancer Institute; credit "tissues": modification of work by Kilbad; Fama Clamosa; Mikael Häggström; credit "organs": modification of work by Mariana Ruiz Villareal; credit "organisms": modification of work by "Crystal"/Flickr; credit "ecosystems": modification of work by US Fish and Wildlife Service Headquarters; credit "biosphere": modification of work by NASA)

Which of the following statements is false?

a. Tissues exist within organs which exist within organ systems.

b. Communities exist within populations which exist within ecosystems.

c. Organelles exist within cells which exist within tissues.

d. Communities exist within ecosystems which exist in the biosphere.

The Diversity of Life

The fact that biology, as a science, has such a broad scope has to do with the tremendous diversity of life on earth. The source of this diversity is **evolution**, the process of gradual change during which new species arise from older species. Evolutionary biologists study the evolution of living things in everything from the microscopic world to ecosystems.

The evolution of various life forms on Earth can be summarized in a phylogenetic tree (**Figure 1.17**). A **phylogenetic tree** is a diagram showing the evolutionary relationships among biological species based on similarities and differences in genetic or physical traits or both. A phylogenetic tree is composed of nodes and branches. The internal nodes represent ancestors and are points in evolution when, based on scientific evidence, an ancestor is thought to have diverged to form two new species. The length of each branch is proportional to the time elapsed since the split.

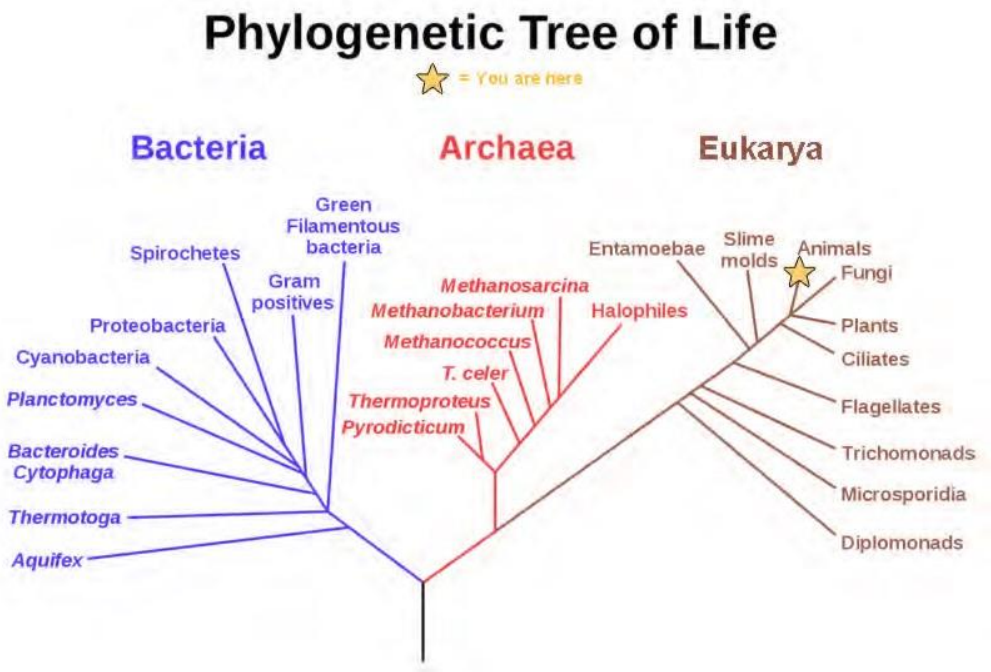


Figure 1.17 *This phylogenetic tree was constructed by microbiologist Carl Woese using data obtained from sequencing ribosomal RNA genes. The tree shows the separation of living organisms into three domains: Bacteria, Archaea, and Eukarya. Bacteria and Archaea are prokaryotes, singlecelled organisms lacking intracellular organelles. (credit: Eric Gaba; NASA Astrobiology Institute)*

Branches of Biological Study

The scope of biology is broad and therefore contains many branches and subdisciplines. Biologists may pursue one of those subdisciplines and work in a more focused field. For instance, molecular biology and biochemistry study biological processes at the molecular and chemical level, including interactions among molecules such as DNA, RNA, and proteins, as well as the way they are regulated. Microbiology, the study of microorganisms, is the study of the structure and function of single-celled organisms. It is quite a broad branch itself, and depending on the subject of study, there are also microbial physiologists, ecologists, and geneticists, among others.

Another field of biological study, neurobiology, studies the biology of the nervous system, and although it is considered a branch of biology, it is also recognized as an interdisciplinary field of study known as neuroscience. Because of its interdisciplinary nature, this subdiscipline studies different functions of the nervous system using molecular, cellular, developmental, medical, and computational approaches.

Figure 1.20 *Researchers work on excavating dinosaur fossils at a site in Castellón, Spain. (credit: Mario Modesto)*

Paleontology, another branch of biology, uses fossils to study life's history (Figure 1.20). Zoology and botany are the study of animals and plants, respectively. Biologists can also specialize as biotechnologists, ecologists, or physiologists, to name just a few areas. This is just a small sample of the many fields that biologists can pursue.

Biology is the culmination of the achievements of the natural sciences from their inception to today. Excitingly, it is the cradle of emerging sciences, such as the biology of brain activity, genetic engineering of custom organisms, and the biology of evolution that uses the laboratory tools of molecular biology to retrace the earliest stages of life on earth. A scan of news headlines—whether reporting on immunizations, a newly discovered species, sports doping, or

a genetically-modified food—demonstrates the way biology is active in and important to our everyday world.

KEY TERMS

abstract opening section of a scientific paper that summarizes the research and conclusions applied science form of science that aims to solve real-world problems atom smallest and most fundamental unit of matter

basic science science that seeks to expand knowledge and understanding regardless of the shortterm application of that knowledge biochemistry study of the chemistry of biological organisms biology the study of living organisms and their interactions with one another and their environments biosphere collection of all the ecosystems on Earth botany study of plants

cell smallest fundamental unit of structure and function in living things community set of populations inhabiting a particular area

conclusion section of a scientific paper that summarizes the importance of the experimental findings control part of an experiment that does not change during the experiment

deductive reasoning form of logical thinking that uses a general inclusive statement to forecast specific results

descriptive science (also, discovery science) form of science that aims to observe, explore, and investigate

discussion section of a scientific paper in which the author interprets experimental results, describes how variables may be related, and attempts to explain the phenomenon in question

ecosystem all the living things in a particular area together with the abiotic, nonliving parts of that environment eukaryote organism with cells that have nuclei and membrane-bound organelles

evolution process of gradual change during which new species arise from older species and some species become extinct falsifiable able to be disproven by experimental results homeostasis ability of an organism to maintain constant internal conditions

hypothesis-based science form of science that begins with a specific question and potential testable answers hypothesis suggested explanation for an observation, which can be tested

inductive reasoning form of logical thinking that uses related observations to arrive at a general conclusion

introduction opening section of a scientific paper, which provides background information about what was known in the field prior to the research reported in the paper life science field of science, such as biology, that studies living things macromolecule large molecule, typically formed by the joining of smaller molecules

materials and methods section of a scientific paper that includes a complete description of the substances, methods, and techniques used by the researchers to gather data

microbiology study of the structure and function of microorganisms

molecular biology study of biological processes and their regulation at the molecular level, including interactions among molecules such as DNA, RNA, and proteins

molecule chemical structure consisting of at least two atoms held together by one or more chemical bonds

natural science field of science that is related to the physical world and its phenomena and processes neurobiology study of the biology of the nervous system organ system level of organization that consists of functionally related interacting organs organelle small structures that exist within cells and carry out cellular functions organism individual living entity organ collection of related tissues grouped together performing a common function paleontology study of life's history by means of fossils

peer-reviewed manuscript scientific paper that is reviewed by a scientist's colleagues who are experts in the field of study

phylogenetic tree diagram showing the evolutionary relationships among various biological species based on similarities and differences in genetic or physical traits or both; in essence, a hypothesis concerning evolutionary connections

physical science field of science, such as geology, astronomy, physics, and chemistry, that studies nonliving matter

plagiarism using other people's work or ideas without proper citation, creating the false impression that those are the author's original ideas population all of the individuals of a species living within a specific area

prokaryote single-celled organism that lacks organelles and does not have nuclei surrounded by a nuclear membrane

results section of a scientific paper in which the author narrates the experimental findings and presents relevant figures, pictures, diagrams, graphs, and tables, without any further interpretation

review article paper that summarizes and comments on findings that were published as primary

literature

science knowledge that covers general truths or the operation of general laws, especially when acquired and tested by the scientific method

scientific method method of research with defined steps that include observation, formulation of a hypothesis, testing, and confirming or falsifying the hypothesis serendipity fortunate accident or a lucky surprise theory tested and confirmed explanation for observations or phenomena tissue group of similar cells carrying out related functions variable part of an experiment that the experimenter can vary or change zoology study of animals

CHAPTER SUMMARY

1.1 The Science of Biology

Biology is the science that studies living organisms and their interactions with one another and their environments. Science attempts to describe and understand the nature of the universe in whole or in part by rational means. Science has many fields; those fields related to the physical world and its phenomena are considered natural sciences.

Science can be basic or applied. The main goal of basic science is to expand knowledge without any expectation of short-term practical application of that knowledge. The primary goal of applied research, however, is to solve practical problems.

Two types of logical reasoning are used in science. Inductive reasoning uses particular results to produce general scientific principles. Deductive reasoning is a form of logical thinking that predicts results by applying general principles. The common thread throughout scientific research is the use of the scientific method, a step-based process that consists of making observations, defining a problem, posing hypotheses, testing these hypotheses, and drawing one or more conclusions. The testing uses proper controls. Scientists present their results in peer-reviewed scientific papers published in scientific journals. A scientific research paper consists of several well-defined sections: introduction, materials and methods, results, and, finally, a concluding discussion. Review papers summarize the research done in a particular field over a period of time.

1.2 Themes and Concepts of Biology

Biology is the science of life. All living organisms share several key properties such as order, sensitivity or response to stimuli, reproduction, growth and development, regulation, homeostasis, and energy processing. Living things are highly organized parts of a hierarchy that includes atoms, molecules, organelles, cells, tissues, organs, and organ systems. Organisms, in turn, are grouped as populations, communities, ecosystems, and the biosphere. The great diversity of life today evolved from less-diverse ancestral organisms over billions of years. A diagram called a phylogenetic tree can be used to show evolutionary relationships among organisms.

Biology is very broad and includes many branches and subdisciplines. Examples include molecular biology, microbiology, neurobiology, zoology, and botany, among others.

ART CONNECTION QUESTIONS

In the example below, the scientific method is used to solve an everyday problem. Order the scientific method steps (numbered items) with the process of solving the everyday problem (lettered items). Based on the results of the experiment, is the hypothesis correct? If it is incorrect, propose some alternative hypotheses.

1. Observation
2. Question
3. Hypothesis (answer)
4. Prediction
5. Experiment
6. Result

a. There is something wrong with the electrical outlet.
b. If something is wrong with the outlet, my coffeemaker also won't work when plugged into it.
c. My toaster doesn't toast my bread.
d. I plug my coffee maker into the outlet.
e. My coffeemaker works.
f. Why doesn't my toaster work?

Decide if each of the following is an example of inductive or deductive reasoning.

a. All flying birds and insects have wings. Birds and insects flap their wings as they move through the air. Therefore, wings enable flight.
b. Insects generally survive mild winters better than harsh ones. Therefore, insect pests will become more problematic if global temperatures increase.
c. Chromosomes, the carriers of DNA, separate into daughter cells during cell division. Therefore, DNA is the genetic material.
d. Animals as diverse as humans, insects, and wolves all exhibit social behavior. Therefore, social behavior must have an evolutionary advantage.

Which of the following statements is false?

a. Tissues exist within organs which exist within organ systems.
b. Communities exist within populations which exist within ecosystems.
c. Organelles exist within cells which exist within tissues.
d. Communities exist within ecosystems which exist in the biosphere.

REVIEW QUESTIONS

1. The first forms of life on Earth were _____.

    a. plants
    b. microorganisms
    c. birds
    d. dinosaurs

2. A suggested and testable explanation for an event is called a _____.
    a. hypothesis
    b. variable
    c. theory
    d. control
3. Which of the following sciences is not considered a natural science?
    a. biology
    b. astronomy
    c. physics
    d. computer science
4. The type of logical thinking that uses related observations to arrive at a general conclusion is called _____.
    a. deductive reasoning
    b. the scientific method
    c. hypothesis-based science
    d. inductive reasoning
5. The process of _____ helps to ensure that a scientist's research is original, significant, logical, and thorough.
    a. publication
    b. public speaking
    c. peer review
    d. the scientific method
6. A person notices that her houseplants that are regularly exposed to music seem to grow more quickly than those in rooms with no music. As a result, she determines that plants grow better when exposed to music. This example most closely resembles which type of reasoning?
    a. inductive reasoning
    b. deductive reasoning
    c. neither, because no hypothesis was made
    d. both inductive and deductive reasoning
7. The smallest unit of biological structure that meets the functional requirements of "living" is the _____.
    a. organ
    b. organelle
    c. cell
    d. macromolecule
8. Viruses are not considered living because they _____.
    a. are not made of cells
    b. lack cell nuclei
    c. do not contain DNA or RNA
    d. cannot reproduce
9. The presence of a membrane-enclosed nucleus is a characteristic of _____.
    a. prokaryotic cells
    b. eukaryotic cells
    c. living organisms

d. bacteria

10. A group of individuals of the same species living in the same area is called a(n) _____.

    a. family
    b. community
    c. population
    d. ecosystem

11. Which of the following sequences represents the hierarchy of biological organization from the most inclusive to the least complex level?

    a. organelle, tissue, biosphere, ecosystem, population
    b. organism, organ, tissue, organelle, molecule
    c. organism, community, biosphere, molecule, tissue, organ
    d. biosphere, ecosystem, community, population, organism

12. Where in a phylogenetic tree would you expect to find the organism that had evolved most recently?

    a. at the base
    b. within the branches
    c. at the nodes
    d. at the branch tip

Academic Skill: Focus on Lecture

As a reminder, here are the types of lectures you might be listening to in this section.

Hand-in-Hand lectures: These lectures are right over the material in the books.

Jumping off Point lectures: these lectures "jump off" from the book material. They bring in materials you cannot read about in the book—they may expand on ideas in the book or provide examples of concepts in the book.

Combination lectures: These lectures combine both Hand-in-hand and Jumping off point lectures.

Use these strategies now to warm-up, work out, and cool down as you listen to the lectures in about Biology.

	Activity
Warm-up	To warm up your brain before a lecture, look over the notes you took in while reading the chapter. Based on the title of the lecture, what do you think it will be about? How does the lecture relate to the textbook chapter that you just finished reading?
Work out	Take notes on the lecture. Review the strategies for taking notes.
Cool Down	To cool down in lectures means to review your notes within 24 hours of taking them. Information from lectures is easy to forget, so the sooner you review them, the better.

Warming up for Notetaking

- Make sure you have the right materials before you begin to listen to the lectures. This might include a pen or pencil, notepaper and a highlighter or two.
- Date your notes.
- Label your notes. You have several lectures to listen to, so make sure each section of your notes contain the title of each lecture.

Working out During Notetaking

Choose a method for taking notes on the lecture and make sure that the method you choose…

- allows you to clearly record main ideas from a lecture
- Is "sustainable." It is impossible to write down every word your instructor says. Therefore, you need to develop a method of taking notes that allows you to record a great deal of information quickly—this may involve developing a series of abbreviations,
- using symbols or creating an outline. Note taking strategies that require you to write out full sentences, spell all words correctly and record every idea are not sustainable because you will quickly fall behind.
- produces reviewable notes. The notes you take during a lecture are supposed to be like a second textbook for your class. They are useless if you cannot use them to study for exams or do other assignments for the class. Your notes need to be legible, and have enough information that, when you go back, you can make sense of what you wrote.

Don't forget the tips as you take notes on the lectures:

Abbreviate

Abbreviate the long words.

Abbreviate common concepts.

Pay Attention to Numbers

Listen for Phrases that Help You Set Goals

Listen for phrases like:

"Today we are going to talk about . . . "

"We are going to discuss the reasons why _____ happened."

"There are five kind of . . . ."

"It is important for you to understand . . . "

"_____ is significant because . . . ."

Listen for Transitions

You may want to look at this online resource. (It is useful for writing as well!)

Listen for these phrases as you listen to the lectures. These phrases will give you clues as to how the speaker is outlining their information.

https://owl.english.purdue.edu/owl/resource/574/02/

Listen to the following lectures from Ted.com. You can also copy and paste the URL into a browser.

Naomi Oreskes: Why we should trust scientists

https://www.ted.com/talks/naomi_oreskes_why_we_should_believe_in_science/transcript

David Deutsch: A New Way to Explain

https://www.ted.com/talks/david_deutsch_a_new_way_to_explain_explanation

Jonathan Drori: The Beautiful Tricks of Flowers

https://www.ted.com/talks/jonathan_drori_the_beautiful_tricks_of_flowers

Drew Berry: Animations of Unseeable Biology

https://www.ted.com/talks/drew_berry_animations_of_unseeable_biology

David Bolinsky: Animates a Cell

https://www.ted.com/talks/david_bolinsky_animates_a_cell

Cooling Down After the Lecture

After taking notes, you are going to want to organize them.

- Create an “index.” After the lecture is over, jot down a few words about the subject of that day’s notes. Put it under the date that you put across the top of the page.
- Use a highlighter to mark important terms.
- Use a different colored pen and/or highlighters to go back to your notes and make your own headings and subheadings.
- Tab your notes.

Having well-organized notes is a great start, but it isn’t quite enough. After you organize your notes, you need to review them. Here are some ways to review your notes:

What type of lecture is it? Hand-in-Hand or Jumping-off-point? How does the lecture relate to the textbook chapter?

Make sure you understood the lecture itself. When you review, pretend you need to tell a classmate who missed the lecture what the main ideas were. Actually explain the notes—either out loud or silently.

Add additional notes of explanation you didn’t get a chance to add in class. Make sure you understand any abbreviations you might have used.

Identify concepts that were not clear to you. Mark confusing parts up with questions marks and find a classmate, a tutor, or your instructor to get the concepts clarified.

Share notes with a classmate. What did he or she write down? How is it different from what you wrote down? What can you add to one another’s notes?

Academic Skill 2: Focus on Writing

Much of the writing you will do for college classes will be Academic Essays—and they can be very different from one another.

A good college writer warms up, works out, then cools down. Here is how that process applies to writing college-level papers:

	Activity
Warm-up	To warm up your brain, carefully read the prompt you were given for your paper. (A prompt is the assignment your instructor gives you that tells you what your paper should be about). Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself "If a stranger were to read my paper over my shoulder, would it make sense?"

Here is your writing prompt. Choose one of the following to write an academic essay.

1. Although the scientific method is used by most of the sciences, it can also be applied to everyday situations. Think about a problem that you may have at home, at school, or with your car, and apply the scientific method to solve it. Give an example of how applied science has had a direct effect on your daily life.

2. Consider the levels of organization of the biological world, and place each of these items in order from smallest level of organization to most encompassing: skin cell, elephant, water molecule, planet Earth, tropical rainforest, hydrogen atom, wolf pack, liver.
3. You go for a long walk on a hot day. Describe the way in which homeostasis keeps your body healthy.
4. Using examples, explain how biology can be studied from a microscopic approach to a global approach.

How will you approach this essay assignment? Review the following structure for an academic essay.

Structure for an Academic Essay

Introduction **Your introductory paragraph will have two main parts.**	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs **Each body paragraph will have three parts.**	*Part 1: Topic Sentenc*e- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.
	Part 2: Evidence- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.

	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence is should be taken seriously.

Conclusion **Your conclusion will have two parts.**	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

Warm up for Writing

Remember to…

1. Make sure to carefully read the prompt you have chosen to write about.
2. What are your goals?
3. Do you know how it will be graded?

Working Out while Writing a Paper

Select the strategies that are most likely to help you achieve your goal.

Strategies for Establishing Authority Remember, the goal of establishing authority is to provide the reader with the information they need to understand your paper and prove to them that you are worth listening to. The following strategies will help you do that.	
Summary	If you are responding to an essay, a video, a lecture or a book, you might choose to summarize its main ideas. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

Strategies for Presenting Evidence Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.	
Summary	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.
Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

Strategies for Evaluating Your Paragraph	
Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?
How is the information presented in the evidence part of the paragraph related?	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else changed as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the “Structure of an Academic Essay” graphic and go through your paper section by section.

1. Do you establish authority?
2. Do you have a thesis statement where it belongs?
3. Do you have a topic sentence for each body paragraph?
4. Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructor’s expectations.

Chapter 5: Logic

Warm Up:

What is my instructor going to ask me to do? What do they hope I will 'get out' of this chapter and unit?" What do you need to know by the time you finish reading this chapter?

Academic Skill: Focus on Reading

	Activity
Warm-up	To warm up your brain, spend a few minutes looking over the material you need to read. Read the headings and subheadings. Look at graphics and pictures if there are any. Ask yourself "What will I be learning in this reading?" "What ideas seem to be important?"
Work out	To work out in reading, you need to read! But it isn't that simple. You need to have a note taking strategy that will allow you to do two things: 1) Figure out what information is most important and 2) Remember that information.
Cool Down	To cool down in reading, see what you can remember about the reading by stating main ideas in your own words, telling a friend what you learned or asking yourself "Which ideas did I read tonight are so important they might end up on an exam?" You can also make a list of things that confused you that you can ask your instructor or a tutor.

In reading, we call the warm up “pre-reading,” the work out “during reading” and the cool-down “after reading.” Whenever you read college-level materials, you need to have strategies for pre-reading, during reading and after reading, just like a good coach will have specific strategies for warming up, working out and cooling down.

Your instructor or tutor will help you decide which strategies to use for what type of reading. However, there are three things to take into consideration about any textbook, article or essay you read that will help you select a good strategy. They are:

1. *Structure*- The very first thing to consider about your reading is how it is structured. Does the author seem to be comparing and contrasting two or more people, ideas, places, processes or events? Does the author seem to be describing how a process such as passing a law, photosynthesis or the evaporation cycle happens? Does the author seem to be defining important terms or concepts? Your instructor will help you notice how your textbook chapters or other reading are organized, and once you have figured out the author’s goals, it is time to consider Purpose.

2. *Purpose*- the second thing to consider about anything you read is what is YOUR purpose for reading the material? Will you have to write a paper over it? Participate in a class discussion? Take a multiple choice test over it? Take an essay test over it? What you will have DO with the information you read should help you determine what strategies you should use to get the most out of your reading. Again, your instructor or tutor will help you think through what strategies will be the most effective ones to use to achieve your purpose.

3. *Preferences*- The final thing to consider is your preferences. Once you have determined the structure of the reading and thought through the purpose, the last factor you can weigh in is how you would like to take notes—which strategies are the most effective for you? Which ones seem to fit your learning style the best? The more experience you have using strategies, the stronger your preferences will become.

Below are the pre, during and after reading strategies you will focus on in this class. All of the strategies can be adapted to work better for you and your instructor can help you figure out the best ways to do that. For now, you can skim the strategies so you are familiar with them and in class you can learn how to use them and which ones are appropriate for what kind of reading.

Warm up

The three strategies described below should be used before you actually read. You might wish to do just one strategy, or it might make sense to use more than one.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There questions about studying in a group if you join a study or tutor group. **Chapter Information** How will I be tested on this material? How many pages and/or sections will I have to read each day to complete the reading before the test? _____ **Group Information (If you're meeting in a group.)** This group will meet again on _____. By then, I will need to read ___ pages and ___ sections.

Pre-Reading Strategy 2: The Foundation Builder	Lay a good foundation for your reading by examine the headings, the subheadings, and the graphs in the entire chapter. Headings tell you what the chapter will be about, which prepares your mind and helps you read more efficiently. Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer **Seems more like an after reading.**	It is important to know where you've been before you move on to somewhere new. You have about 24 hours to review information you learned when you study before you forget it forever. Here is a technique for reviewing book notes: Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Working out

While you are reading, you can't simply run your eyes over the words and expect to retain anything anymore than you can expect to sit quietly in the corner at a choir rehearsal and learn the songs. While you read, you need to have a way to interact with the material so you can remember it.

Strategy 1: **Connector**	As you read new sections of your text book or book you need to relate the new information you are learning to what you have already read. **How does this section fit into the book?** How does this section connect to the previous section? Introduces a topic that: ➢ Supports the big main idea ➢ Describes another step in a process you are learning ➢ Describes events in the order in which they occur

Strategy 2: **Illustrator**	Your job is to create pictures or graphs to represent the ideas in this section of your textbook. It is best if the graphic you pick will help you see the relationships between the different ideas you must learn. Are you learning about a process or are you learning about events as they happened? Make a timeline. Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3: **Note taker**	In this class, you will learn a variety of notetaking strategies. They might include matrix notes, Cornell notes, outline style and others. If you feel that one of these note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section.

	Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

Cool Down

Many students make the mistake of completing the read they have to do for a particular day, closing the book and moving on to the next task. This is like the athlete who leaves practice before the cool down! In addition to risking injury to her muscles, this athlete also misses the end of practice conversations about what the team is doing well and what practices will emphasize in the future. Students need to have a cool down to make sure they understand what they read that day and to think about what some good ways are to study in the days to come.

Strategy 1: **The Summarizer**	After you finish reading a section or your textbook or a chapter in a book, make it into a neat package by summarizing it. Look through the chapter section for key words. They might be terms, but they might also be words that show how terms are related. Once you have written down key words, put those words in a few sentences that you write in your own words—close the book when you do this. Once you're finished, open it up again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Key words: Summary without looking at the book:

	Summary after looking at the book and making changes:

Strategy 2: Test Buster	If you could guess what the question on the test will be, you'd have no trouble getting an "A." Find out what kind of questions you will be asked on the exam. Multiple choice? Fill-in-the blank? Short answer? Essay? Will it be open book? Know how many questions there will be, and how many points the test will be worth. Once you know all that, you will be a great position to make good, educated guesses about what the questions on the test will be. After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.

Reading: Logic Textbook: Chapter 1: Reconstructing and analyzing arguments

1.1 What is an argument?

This is an introductory textbook in logic and critical thinking. Both logic and critical thinking centrally involve the analysis and assessment of arguments. “Argument” is a word that has multiple distinct meanings, so it is important to be clear from the start about the sense of the word that is relevant to the study of logic. In one sense of the word, an argument is a heated exchange of differing views as in the following:

> Sally: Abortion is morally wrong and those who think otherwise are seeking to justify murder!
>
> Bob: Abortion is not morally wrong and those who think so are right-wing bigots who are seeking to impose their narrow-minded views on all the rest of us!

Sally and Bob are having an argument in this exchange. That is, they are each expressing conflicting views in a heated manner. However, that is not the sense of “argument” with which logic is concerned. Logic concerns a different sense of the word “argument.” An argument, in this sense, is a reason for thinking that a statement, claim or idea is true. For example:

> Sally: Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being.

In this example Sally has given an argument against the moral permissibility of abortion. That is, she has given us a reason for thinking that abortion is morally wrong. The conclusion of the argument is the first four words, “abortion is morally wrong.” But whereas in the first example Sally was simply asserting that abortion is wrong (and then trying to put down those who support it), in this example she is offering a reason for why abortion is wrong.

We can (and should) be more precise about our definition of an argument. But before we can do that, we need to introduce some further terminology that we will use in our definition. As I’ve

already noted, the conclusion of Sally's argument is that abortion is morally wrong. But the reason for thinking the conclusion is true is what we call the premise. So we have two parts of an argument: the premise and the conclusion. Typically, a conclusion will be supported by two or more premises. Both premises and conclusions are statements. A statement is a type of sentence that can be true or false and corresponds to the grammatical category of a "declarative sentence." For example, the sentence,

The Nile is a river in northeastern Africa

is a statement. Why? Because it makes sense to inquire whether it is true or false. (In this case, it happens to be true.) But a sentence is still a statement even if it is false. For example, the sentence,

The Yangtze is a river in Japan

is still a statement; it is just a false statement (the Yangtze River is in China). In contrast, none of the following sentences are statements:

Please help yourself to more casserole

Don't tell your mother about the surprise

Do you like Vietnamese pho?

The reason that none of these sentences are statements is that it doesn't make sense to ask whether those sentences are true or false (rather, they are requests or commands, and questions, respectively).

So, to reiterate: all arguments are composed of premises and conclusions, which are both types of statements. The premises of the argument provide a reason for thinking that the conclusion is true. And arguments typically involve more than one premise. A standard way of capturing the structure of an argument is by numbering the premises and conclusion. For example, recall Sally's argument against abortion:

> Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being.

We could capture the structure of that argument like this:

1. It is morally wrong to take the life of an innocent human being
2. A fetus is an innocent human being
3. Therefore, abortion is morally wrong

By convention, the last numbered statement (also denoted by the “therefore”) is the conclusion and the earlier numbered statements are the premises. This is what we call putting an argument into standard argument form. We can now give a more precise definition of an argument. An argument is a set of statements, some of which (the premises) attempt to provide a reason for thinking that some other statement (the conclusion) is true. Although arguments are typically given in order to convince or persuade someone of the conclusion, the argument itself is independent of one’s attempt to use it to convince or persuade. For example, I have just given you this argument not in an attempt to convince you that abortion is morally wrong, but as an illustration of what an argument is. Later on in this chapter and in this book we will learn some techniques of evaluating arguments, but for now the goal is to learn to identify an argument, including its premises and conclusion(s). It is important to be able to identify arguments and understand their structure, whether or not you agree with conclusion of the argument. In the next section I will provide some techniques for being able to identify arguments.

Exercise 1: Which of the following sentences are statements and which are not?

1. No one understands me but you.
2. Alligators are on average larger than crocodiles.
3. Is an alligator a reptile or a mammal?
4. An alligator is either a reptile or a mammal.
5. Don’t let any reptiles into the house.
6. You may kill any reptile you see in the house.
7. East Africans are not the best distance runners.
8. Obama is not a Democrat.
9. Some humans have wings.
10. Some things with wings cannot fly.

11. Was Obama born in Kenya or Hawaii?
12. Oh no! A grizzly bear!
13. Meet me in St. Louis.
14. We met in St. Louis yesterday.
15. I do not want to meet a grizzly bear in the wild.

1.2 Identifying arguments

The best way to identify whether an argument is present is to ask whether there is a statement that someone is trying to establish as true by basing it on some other statement. If so, then there is an argument present. If not, then there isn't. Another thing that can help in identifying arguments is knowing certain key words or phrases that are premise indicators or conclusion indicators. For example, recall Sally's abortion argument:

> Abortion is morally wrong because it is wrong to take the life of an innocent human being, and a fetus is an innocent human being.

The word "because" here is a premise indicator. That is, "because" indicates that what follows is a reason for thinking that abortion is morally wrong. Here is another example:

> I know that the student plagiarized since I found the exact same sentences on a website and the website was published more than a year before the student wrote the paper.

In this example, the word "since" is a premise indicator because what follows it is a statement that is clearly intended to be a reason for thinking that the student plagiarized (i.e., a premise). Notice that in these two cases, the premise indicators "because" and "since" are interchangeable: I could have used "because" in place of "since" or "since" in the place of "because" and the meaning of the sentences would have been the same. In addition to premise indicators, there are also conclusion indicators. Conclusion indicators mark that what follows is the conclusion of an argument. For example,

> Bob-the-arsonist has been dead for a year, so Bob-the-arsonist didn't set the fire at the East Lansing Starbucks last week.

In this example, the word “so” is a conclusion indicator because what follows it is a statement that someone is trying to establish as true (i.e., a conclusion). Here is another example of a conclusion indicator:

> A poll administered by Gallup (a respected polling company) showed candidate x to be substantially behind candidate y with only a week left before the vote, therefore candidate y will probably not win the election.

In this example, the word “therefore” is a conclusion indicator because what follows it is a statement that someone is trying to establish as true (i.e., a conclusion). As before, in both of these cases the conclusion indicators “so” and “therefore” are interchangeable: I could have used “so” in place of “therefore” or “therefore” in the place of “so” and the meaning of the sentences would have been the same.

Table 1 contains a list of some common premise and conclusion indicators:

Premise indicators	**Conclusion indicators**
since	therefore
because	so
for	hence
as	thus
given that	implies that
seeing that	consequently
for the reason that	it follows that
is shown by the fact that	we may conclude that

Although these words and phrases can be used to identify the premises and conclusions of arguments, they are not failsafe methods of doing so. Just because a sentence contains them does not mean that you are dealing with an argument. This can easily be shown by examples like these:

I have been running competitively since 1999.

I am so happy to have finally finished that class.

Although “since” can function as a premise indicator and although “so” can function as a conclusion indicator, neither one is doing so here. This shows that you can’t simply mindlessly use occurrences of these words in sentences to show that there is an argument being made. Rather, we have to rely on our understanding of the English sentence in order to determine whether an argument is being made or not. Thus, the best way to determine whether an argument is present is by asking the question: Is there a statement that someone is trying to establish as true or explain why it is true by basing it on some other statement? If so, then there is an argument present. If not, then there isn’t. Notice that if we apply this method to the above examples, we will see that there is no argument present because there is no statement that someone is trying to establish as true by basing it on some other statement. For example, the sentence “I have been running competitively since 1999” just contains one statement, not two. But arguments always require at least two separate statements—one premise and one conclusion, so it cannot possibly be an argument.

Another way of explaining why these occurrences of “so” and “since” do not indicate that an argument is present is by noting that both premise indicators and conclusion indicators are, grammatically, conjunctions. A grammatical conjunction is a word that connects two separate statements. So, if a word or term is truly being used as a premise or conclusion indicator, it must connect two separate statements. Thus, if “since” were really functioning as a premise indicator in the above example then what followed it would be a statement. But “1999” is not a statement at all. Likewise, in the second example “so” is not being used as a conclusion indicator because it is not conjoining two separate statements. Rather, it is being used to modify the extent of “happy.” In contrast, if I were to say “Tom was sleeping, so he couldn’t have answered the phone,” then “so” is being used as a conclusion indicator. In this case, there are clearly two separate statements (“Tom was sleeping” and “Tom couldn’t have answered the phone”) and one is being used as the basis for thinking that the other is true.

If there is any doubt about whether a word is truly a premise/conclusion indicator or not, you can use the substitution test. Simply substitute another word or phrase from the list of premise indicators or conclusion indicators and see if the resulting sentence still makes sense. If it does, then you are probably dealing with an argument. If it doesn’t, then you probably aren’t. For example, we can substitute “it follows that” for “so” in the Bob-the-arsonist example:

> Bob-the-arsonist has been dead for a year, it follows that Bob-the-arsonist didn't set the fire at the East Lansing Starbucks last week.

However, we cannot substitute "because" for "so" in the so-happy-I-finished- that-class example:

> I am because happy to have finally finished that class.

Obviously, in the latter case the substitution of one conclusion indicator for another makes the sentence meaningless, which means that the "so" that occurred originally wasn't functioning as a conclusion indicator.

Exercise 2: Which of the following are arguments? If it is an argument, identify the conclusion of the argument.

1. The woman in the hat is not a witch since witches have long noses and she doesn't have a long nose.
2. I have been wrangling cattle since before you were old enough to tie your own shoes.
3. Albert is angry with me so he probably won't be willing to help me wash the dishes.
4. First I washed the dishes and then I dried them.
5. If the road wasn't icy, the car wouldn't have slid off the turn.
6. Albert isn't a fireman and he isn't a fisherman either.
7. Are you seeing that rhinoceros over there? It is huge!
8. The fact that obesity has become a problem in the U.S. is shown by the fact that obesity rates have risen significantly over the past four decades.
9. Bob showed me a graph with the rising obesity rates and I was very surprised to see how much they've risen.
10. Albert isn't a fireman because Albert is a Greyhound, which is a kind of dog, and dogs can't be firemen.
11. Charlie and Violet are dogs and since dogs don't sweat, it is obvious that Charlie and Violet don't sweat.
12. The reason I forgot to lock the door is that I was distracted by the clown riding a unicycle down our street while singing Lynyrd Skynyrd's "Simple Man."
13. What Bob told you is not the real reason that he missed his plane to Denver.

14. Samsung stole some of Apple's patents for their smartphones, so Apple stole some of Samsung's patents back in retaliation.
15. No one who has ever gotten frostbite while climbing K2 has survived to tell about it, therefore no one ever will.

1.2 Arguments vs. explanations

So far I have defined arguments in terms of premises and conclusions, where the premises are supposed to provide a reason (support, evidence) for accepting the conclusion. Many times the goal of giving an argument is simply to establish that the conclusion is true. For example, when I am trying to convince someone that obesity rates are rising in the U.S. I may cite evidence such as studies from the Center for Disease Control (CDC) and the National Institute of Health (NIH). The studies I cite would function as premises for the conclusion that obesity rates are rising. For example:

> We know that obesity is on the rise in the U.S. because multiple studies carried out by the CDC and NIH have consistently shown a rise in obesity over the last four decades.

We could put this simple argument into standard form like this:

1. Multiple studies by the CDC and NIH have consistently shown a rise in obesity over the last four decades.

2. Therefore, obesity is on the rise in the U.S.

The standard form argument clearly distinguishes the premise from the conclusion and shows how the conclusion is supposed to be supported by the evidence offered in the premise. Again, the goal of this simple argument would be to convince someone that the conclusion is true. However, sometimes we already know that a statement or claim is true and we are trying to establish why it is true rather than that it is true. An argument that attempts to show why its conclusion is true is an explanation. Contrast the previous example with the following:

> The reason that the rate of obesity is on the rise in the U.S. is that the foods we most often consume over the past four decades have increasingly contained high levels of sugar and low levels of dietary fiber. Since eating foods high in sugar and low in fiber triggers the insulin system to start storing those calories as fat, it follows that people who consume foods high in sugar and low in fiber will tend to store more of the calories consumed as fat.

This passage gives an explanation for why obesity is on the rise in the U.S. Unlike the earlier example, here it is taken for granted that obesity is on the rise in the U.S. That is the claim whose truth we are trying to explain. We can put the obesity explanation into standard form just like any other argument. In order to do this, I will make some paraphrases of the premises and conclusion of the argument (for more on how to do this, see section 1.5 below).

1. Over the past four decades, Americans have increasingly consumed foods high in sugar and low in fiber.
2. Consuming foods high in sugar and low in fat triggers the insulin system to start storing those calories as fat.
3. When people store more calories as fat, they tend to become obese.
4. Therefore, the rate of obesity is on the rise in the U.S.

Notice that in this explanation the premises (1-3) attempt to give a reason for why the conclusion is true, rather than a reason for thinking that the conclusion is true. That is, in an explanation we assume that what we are trying to explain (i.e., the conclusion) is true. In this case, the premises are supposed to show why we should expect or predict that the conclusion is true. Explanations often give us an understanding of why the conclusion is true. We can think of explanations as a type of argument, we just have to distinguish two different types of argument: those that attempt to establish that their conclusion is true (arguments), and those that attempt to establish why their conclusion is true (explanations).

Exercise 3: Which of the following is an explanation and which is an argument? Identify the main conclusion of each argument or explanation. (Remember if the premise(s) seems to be establishing that the conclusion is true, it is an argument, but if the premise(s) seems to be establishing why the conclusion is true, it is an explanation.)

1. Wanda rode the bus today because her car was in the shop.
2. Since Wanda doesn't have enough money in her bank account, she has not yet picked up her car from the shop.
3. Either Bob or Henry rode the bus to work today. But it wasn't Henry because I saw him riding his bike to work. Therefore, it was Bob.

4. It can't be snowing right now since it only snows when it is 32 degrees or below and right now it is 40 degrees.
5. The reason some people with schizophrenia hear voices in their head is that the cognitive mechanism that monitors their own self-talk is malfunctioning and they attribute their own self-talk to some external source.
6. Fracking should be allowed because, although it does involve some environmental risk, it reduces our dependence on foreign oil and there is much greater harm to the environment due to foreign oil drilling than there is due to fracking.
7. Wanda could not have ridden the bus today because today is a city- wide holiday and the bus service is not operating.
8. The Tigers lost their star pitcher due to injury over the weekend, therefore the Tigers will not win their game against the Pirates.
9. No one living in Pompeii could have escaped before the lava from Mt. Vesuvius hit. The reason is simple: the lava was flowing too fast and there was nowhere to go to escape it in time.
10. The reason people's allergies worsen when they move to Cincinnati is that the pollen count in Cincinnati is higher than almost anywhere else in the surrounding area.

1.3 More complex argument structures

So far we have seen that an argument consists of a premise (typically more than one) and a conclusion. However, very often arguments and explanations have a more complex structure than just a few premises that directly support the conclusion. For example, consider the following argument:

> No one living in Pompeii could have survived the eruption of Mt. Vesuvius. The reason is simple: the lava was flowing too fast and there was nowhere to go to escape it in time. Therefore, this account of the eruption, which claims to have been written by an eyewitness living in Pompeii, was not actually written by an eyewitness.

The main conclusion of this argument—the statement that depends on other statements as evidence but doesn't itself provide any evidence for any other statement—is:

A. This account of the eruption of Mt. Vesuvius was not actually written by an eyewitness.

However, the argument's structure is more complex than simply having a couple of premises that provide evidence directly for the conclusion. Rather, some statement provides evidence directly for the main conclusion, but that statement itself is supported by another statement. To determine the structure of an argument, we must determine which statements support which. We can use our premise and conclusion indicators to help with this. For example, the passage contains the phrase, "the reason is..." which is a premise indicator, and it also contains the conclusion indicator, "therefore." That conclusion indicator helps us to identify the main conclusion, but the more important thing to see is that statement A does not itself provide evidence or support for any of the other statements in the argument, which is the clearest reason why statement A is the main conclusion of the argument. The next question we must answer is: which statement most directly supports A? What most directly supports A is:

B. No one living in Pompeii could have survived the eruption of Mt. Vesuvius.

However, there is also a reason offered in support of B. That reason is that:

C. The lava from Mt. Vesuvius was flowing too fast and there was nowhere for someone living in Pompeii to go in order to escape it in time.

So the main conclusion (A) is directly supported by B, and B is supported by C. Since B acts as a premise for the main conclusion but is also itself the conclusion of further premises, we refer to B as an intermediate conclusion. The important thing to recognize here is that one and the same statement can act as both a premise and a conclusion. Statement B is a premise that supports the main conclusion (A), but it is also itself a conclusion that follows from C. Here is how we would put this complex argument into standard form (using numbers this time, as we always do when putting an argument into standard form):

1. The lava from Mt. Vesuvius was flowing too fast and there was nowhere for someone living in Pompeii to go in order to escape it in time.
2. Therefore, no one living in Pompeii could have survived the eruption of Mt. Vesuvius. (from 1)
3. Therefore, this account of the eruption of Mt. Vesuvius was not actually written by an eyewitness. (from 2)

Notice that at the end of statement 2 I have written in parentheses “from 1” (and likewise at the end of statement 3 I have written “from 2”). This is a shorthand way of saying: “this statement follows from statement 1.” We will use this convention as a way of keeping track of the structure of the argument. It may also help to think about the structure of an argument spatially, as figure 1 shows:

The main argument here (from 2 to 3) contains a subargument, in this case the argument from 1 to 2. A subargument, as the term suggests, is a part of anargument that provides indirect support for the main argument. The main argument is simply the argument whose conclusion is the main conclusion.

Another type of structure that arguments can have is when two or more premises provide direct but independent support for the conclusion. Here is an example of an argument with that structure:

> I know that Wanda rode her bike to work today because when she arrived at work she had her right pant leg rolled up (which cyclists do in order to keep their pants legs from getting caught in the chain). Moreover, our coworker, Bob, who works in accounting, saw her riding towards work at 7:45 am.

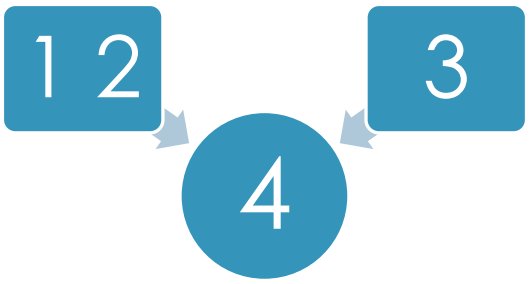
The conclusion of this argument is “Wanda rode her bike to work today” and there are two premises that provide independent support for it: the fact that

> Wanda had her pant leg cuffed and the fact that Bob saw her riding her bike.

Here is the argument in standard form:

1. Wanda arrived at work with her right pant leg rolled up.
2. Cyclists often roll up their right pant leg.
3. Bob saw Wanda riding her bike towards work at 7:45.
4. Therefore, Wanda rode her bike to work today. (from 1-2, 3 independently)

Again, notice that next to statement 4 of the argument I have written the premises from which that conclusion follows. In this case, in order to avoid any ambiguity, I have noted that the support for the conclusion comes independently from statements 1 and 2, on the one hand, and from statement 3, on the other hand. It is important to point out that an argument or subargument can be supported by one or more premises. We see this in the present argument since the conclusion (4) is supported jointly by 1 and 2, and singly by 3. As before, we can represent the structure of this argument spatially, as figure 2 shows:



There are endless different argument structures that can be generated from these few simple patterns. At this point, it is important to understand that arguments can have these different structures and that some arguments will be longer and more complex than others. Determining the structure of very complex arguments is a skill that takes some time to master. Even so, it may help to remember that any argument structure ultimately traces back to some combination of these.

Exercise 4: Write the following arguments in standard form and show how the argument is structured using a diagram like the ones I have used in this section.

1. There is nothing wrong with prostitution because there is nothing wrong with consensual sexual and economic interactions between adults. Moreover, since there's no difference between a man who goes on a blind date with a woman, buys her dinner and then has sex with her and a man who simply pays a woman for sex, that is another reason for why there is nothing wrong with prostitution.
2. Prostitution is wrong because it involves women who have typically been sexually abused as children. We know that most of these women have been abused from multiple surveys done with women who have worked in prostitution and that show a high percentage of self-reported sexual abuse as children.
3. There was someone in this cabin recently because there was warm water in the tea kettle and because there was wood still smoldering in the fireplace. But the person couldn't have been Tim because Tim has been with me the whole time. Therefore, there must be someone else in these woods.
4. It is possible to be blind and yet run in the Olympic Games since Marla Runyan did it at the 2000 Sydney Olympics.
5. The train was late because it had to take a longer, alternate route since the bridge was out.
6. Israel is not safe if Iran gets nuclear missiles since Iran has threatened multiple times to destroy Israel and if Iran had nuclear missiles it would be able to carry out this threat. Moreover, since Iran has been developing enriched uranium, they have the key component needed for nuclear weapons—every other part of the process of building a nuclear weapon is simple compared to that. Therefore, Israel is not safe.
7. Since all professional hockey players are missing front teeth and Martin is a professional hockey player, it follows that Martin is missing front teeth. And since almost all professional athletes who are missing their front teeth have false teeth, it follows that Martin probably has false teeth.
8. Anyone who eats the crab rangoon at China Food restaurant will probably have stomach troubles afterward. It has happened to me every time, which is why it will probably happen to other people as well. Since Bob ate the crab rangoon at China Food restaurant, he will probably have stomach troubles afterward.
9. Albert and Caroline like to go for runs in the afternoon in Hyde Park. Since Albert never runs alone, we know that any time Albert is running, Caroline is running too. But since Albert looks like he has just run (since he is panting hard), it follows that Caroline must have ran too.
10. Just because Jeremy's prints were on the gun that killed Tim and the gun was registered to Jeremy, it doesn't follow that Jeremy killed Tim since Jeremy's prints would certainly be on his own gun and someone else could have stolen Jeremy's gun and used it to kill Tim.

1.4 Using your own paraphrases of premises and conclusions to reconstruct arguments in standard form

Although sometimes we can just lift the premises and conclusion verbatim from the argument, we cannot always do this. Paraphrases of premises or conclusions are sometimes needed in order to make the standard form argument as clear as possible. A paraphrase is the use of different words to capture the same idea in a clearer way. There will always be multiple ways of paraphrasing premises and conclusions and this means that there will never be just one way of putting an argument into standard form. In order to paraphrase well, you will have to rely on your understanding of English to come up with what you think is the best way of capturing the essence of the argument. Again, typically there is no single right way to do this, although there are certainly better and worse ways of doing it. For example, consider the following argument:

> Just because Jeremy's prints were on the gun that killed Tim and the gun was registered to Jeremy, it doesn't follow that Jeremy killed Tim since Jeremy's prints would certainly be on his own gun and someone else could have stolen Jeremy's gun and used it to kill Tim.

What is the conclusion of this argument? (Think about it before reading on.)

Here is one way of paraphrasing the conclusion:

> The fact that Jeremy's prints were on the gun that killed Tim and the gun was registered to Jeremy doesn't mean that Jeremy killed Tim.

This statement seems to capture the essence of the main conclusion in the above argument. The premises of the argument would be:

1. Jeremy's prints would be expected to be on a gun that was registered to him
2. Someone could have stolen Jeremy's gun and then used it to kill Tim

Notice that while I have paraphrased the first premise, I have left the second premise almost exactly as it appeared in the original paragraph. As I've said, paraphrases are needed in order to try to make the standard form argument as clear as possible and this is what I've tried to do in capturing premise 1 as well as the conclusion of this argument. So here is the reconstructed argument in standard form:

1. Jeremy's prints would be expected to be on a gun that was registered to him
2. Someone could have stolen Jeremy's gun and then used it to kill Tim
3. Therefore, the fact that Jeremy's prints were on the gun that killed Tim and the gun was registered to Jeremy doesn't mean that Jeremy killed Tim. (from 1-2)

However, as I have just noted, there is more than one way of paraphrasing the premises and conclusion of the argument. To illustrate this, I will give a second way that one could accurately capture this argument in standard form. Here is another way of expressing the conclusion:

We do not know that Jeremy killed Tim.

That is clearly what the above argument is trying to ultimately establish and it is a much simpler (in some ways) conclusion than my first way of paraphrasing the conclusion. However, it also takes more liberties in interpreting the argument than my original paraphrase. For example, in the original argument there is no occurrence of the word "know." That is something that I am introducing in my own paraphrase. That is a totally legitimate thing to do, as long as introducing new terminology helps us to clearly express the essence of the premise or conclusion that we're trying to paraphrase.Since my second paraphrase of the conclusion differs from my first paraphrase, you can expect that my premises will differ also. So how shall I paraphrase the premises that support this conclusion? Here is another way of paraphrasing the premises and putting the argument into standard form:

1. Tim was killed by a gun that was registered to Jeremy and had Jeremy's prints on it.
2. It is possible that Jeremy's gun was stolen from him.
3. If Jeremy's gun was stolen from him, then Jeremy could not have killed Tim.
4. Therefore, we do not know that Jeremy killed Tim. (from 1-3)

Notice that this standard form argument has more premises than my first reconstruction of the standard form argument (which consisted of only three statements). I have taken quite a few liberties in interpreting and paraphrasing this argument, but what I have tried to do is to get down to the most essential logic of the original argument. The paraphrases of the premises I have used are quite different from the wording that occurs in the original paragraph. I have introduced phrases such as “it is possible that” as well as conditional statements (if...then statements), such as premise 3. Nonetheless, this reconstruction seems to get at the essence of the logic of the original argument. As long as your paraphrases help you to do that, they are good paraphrases. Being able to reconstruct arguments like this takes many years of practice in order to do it well, and much of the material that we will learn later in the text will help you to better understand how to capture an argument in standard form, but for now it is important to recognize that there is never only one way of correctly capturing the standard form of an argument. And the reason for this is that there are multiple, equally good, ways of paraphrasing the premises and conclusion of an argument.

1.6. Validity

So far we have discussed what arguments are and how to determine their structure, including how to reconstruct arguments in standard form. But we have not yet discussed what makes an argument good or bad. The central concept that you will learn in logic is the concept of validity. Validity relates to how well the premises support the conclusion, and it is the golden standard that every argument should aim for. A valid argument is an argument whose conclusion cannot possibly be false, assuming that the premises are true. Another way of putting this is as a conditional statement: A valid argument is an argument in which if the premises are true, the conclusion must be true. Here is an example of a valid argument:

1. Violet is a dog
2. Therefore, Violet is a mammal (from 1)

You might wonder whether it is true that Violet is a dog (maybe she’s a lizard or a buffalo—we have no way of knowing from the information given). But, for the purposes of validity, it doesn’t matter whether premise 1 is actually true or false. All that matters for validity is whether the conclusion follows from the premise. And we can see that the conclusion, Violet is a mammal, does seem to follow from the premise, Violet is a dog. That is, given the truth of the premise, the conclusion has to be true. This argument is clearly valid since if we assume that “Violet is a dog” is true, then, since all dogs are mammals, it follows that “Violet is a mammal” must also be true.

As we've just seen, whether or not an argument is valid has nothing to do with whether the premises of the argument are actually true or not. We can illustrate this with another example, where the premises are clearly false:

Everyone born in France can speak French

Barack Obama was born in France

Therefore, Barak Obama can speak French (from 1-2)

This is a valid argument. Why? Because when we assume the truth of the premises (everyone born in France can speak French, Barack Obama was born in France) the conclusion (Barack Obama can speak French) must be true. Notice that this is so even though none of these statements is actually true. Not everyone born in France can speak French (think about people who were born there but then moved somewhere else where they didn't speak French and never learned it) and Obama was not born in France, but it is also false that Obama can speak French. So we have a valid argument even though neither the premises nor the conclusion is actually true. That may sound strange, but if you understand the concept of validity, it is not strange at all. Remember: validity describes the relationship between the premises and conclusion, and it means that the premises imply the conclusion, whether or not that conclusion is true. In order to better understand the concept of validity, let's look at an example of an invalid argument:

1. George was President of the United States
2. Therefore, George was elected President of the United States (from 1)

This argument is invalid because it is possible for the premise to be true and yet the conclusion false. Here is a counterexample to the argument. Gerald Ford was President of the United States but he was never elected president, since Ford Replaced Richard Nixon when Nixon resigned in the wake of the Watergate scandal.

So it doesn't follow that just because someone is President of the United States that they were elected President of the United States. In other words, it is possible for the premise of the argument to be true and yet the conclusion false. And this means that the argument is invalid. If an argument is invalid it will always be possible to construct a counterexample to show that it is invalid (as I have done with the Gerald Ford scenario). A counterexample is simply a description

of a scenario in which the premises of the argument are all true while the conclusion of the argument is false.

In order to determine whether an argument is valid or invalid we can use what I'll call the informal test of validity. To apply the informal test of validity ask yourself whether you can imagine a world in which all the premises are true and yet the conclusion is false. If you can imagine such a world, then the argument is invalid. If you cannot imagine such a world, then the argument is valid.

Notice: it is possible to imagine a world where the premises are true even if the premises aren't, as a matter of actual fact, true. This is why it doesn't matter for validity whether the premises (or conclusion) of the argument are actually true. It will help to better understand the concept of validity by applying the informal test of validity to some sample arguments.

1. Joan jumped out of an airplane without a parachute
2. Therefore, Joan fell to her death (from 1)

To apply the informal test of validity we have to ask whether it is possible to imagine a scenario in which the premise is true and yet the conclusion is false (if so, the argument is invalid). So, can we imagine a world in which someone jumped out of an airplane without a parachute and yet did not fall to her death?

(Think about it carefully before reading on.) As we will see, applying the informal test of validity takes some creativity, but it seems clearly possible that Joan could jump out of an airplane without a parachute and not die—she could be perfectly fine, in fact. All we have to imagine is that the airplane was not operating and in fact was on the ground when Joan jumped out of it. If that were the case, it would be a) true that Joan jumped out of an airplane without a parachute and yet b) false that Joan fell to her death. Thus, since it is possible to imagine a scenario in which the premise is true and yet the conclusion is false, the argument is invalid. Let's slightly change the argument, this time making it clear that the plane is flying:

> Joan jumped out of an airplane travelling 300 mph at a height of 10,000 ft without a parachute
>
> Joan fell to her death (from 1)

Is this argument valid? You might think so since you might think that anyone who did such a thing would surely die. But is it possible to not die in the scenario described by the premise? If you think about it, you'll realize that there are lots of ways someone could survive. For example, maybe someone else who was wearing a parachute jumped out of the plane after them, caught them and attached the parachute-less person to them, and then pulled the ripcord and they both landed on the ground safe and sound. Or maybe Joan was performing a stunt and landed in a giant net that had been set up for that purpose. Or maybe she was just one of those people who, although they did fall to the ground, happened to survive (it has happened before). All of these scenarios are consistent with the information in the first premise being true and also consistent with the conclusion being false. Thus, again, any of these counterexamples show that this argument is invalid. Notice that it is also possible that the scenario described in the premises ends with Joan falling to her death. But that doesn't matter because all we want to know is whether it is possible that she doesn't. And if it is possible, what we have shown is that the conclusion does not logically follow from the premise alone. That is, the conclusion doesn't have to be true, even if we grant that the premise is. And that means that the argument is not valid (i.e., it is invalid). Let's switch examples and consider a different argument.

1. A person can be President of the United States only if they were born in the United States.
2. Obama is President of the United States.
3. Kenya is not in the United States.
4. Therefore, Obama was not born in Kenya (from 1-3)

In order to apply the informal test of validity, we have to ask whether we can imagine a scenario in which the premises are both true and yet the conclusion is false. So, we have to imagine a scenario in which premises 1, 2, and 3 are true and yet the conclusion ("Obama was not born in Kenya") is false. Can you imagine such a scenario? You cannot. The reason is that if you are imagining that it is a) true that a person can be President of the United States only if they were born in the United States, b) true that Obama is president and c) true that Kenya is not in the U.S., then it must be true that Obama was not born in Kenya. Thus we know that on the assumption of the truth of the premises, the conclusion must be true. And that means the argument is valid. In this example, however, premises 1, 2, and 3 are not only assumed to be true but are actually true. However, as we have already seen, the validity of an argument does not depend on its premises actually being true. Here is another example of a valid argument to illustrate that point.

A person can be President of the United States only if they were born in Kenya

Obama is President of the United States

Therefore, Obama was born in Kenya (from 1-2)

Clearly, the first premise of this argument is false. But if we were to imagine a scenario in which it is true and in which premise 2 is also true, then the conclusion ("Obama was born in Kenya") must be true. And this means that the argument is valid. We cannot imagine a scenario in which the premises of the argument are true and yet the conclusion is false. The important point to recognize here—a point I've been trying to reiterate throughout this section—is that the validity of the argument does not depend on whether or not the premises (or conclusion) are actually true. Rather, validity depends only on the logical relationship between the premises and the conclusion. The actual truth of the premises is, of course, important to the quality of the argument, since if the premises of the argument are false, then the argument doesn't provide any reason for accepting the conclusion. In the next section we will address this topic.

Exercise 5: Determine whether or not the following arguments are valid by using the informal test of validity. If the argument is invalid, provide a counterexample.

1. Katie is a human being. Therefore, Katie is smarter than a chimpanzee.
2. Bob is a fireman. Therefore, Bob has put out fires.
3. Gerald is a mathematics professor. Therefore, Gerald knows how to teach mathematics.
4. Monica is a French teacher. Therefore, Monica knows how to teach French.
5. Bob is taller than Susan. Susan is taller than Frankie. Therefore, Bob is taller than Frankie.
6. Craig loves Linda. Linda loves Monique. Therefore, Craig loves Monique.
7. Orel Hershizer is a Christian. Therefore, Orel Hershizer communicates with God.
8. All Muslims pray to Allah. Muhammad is a Muslim. Therefore, Muhammad prays to Allah.
9. Some protozoa are predators. No protozoa are animals. Therefore, some predators are not animals.
10. Charlie only barks when he hears a burglar outside. Charlie is barking. Therefore, there must be a burglar outside.

1.5 Soundness

A good argument is not only valid, but also sound. Soundness is defined in terms of validity, so since we have already defined validity, we can now rely on it to define soundness. A sound argument is a valid argument that has all true premises. That means that the conclusion of a sound argument will always be true. Why? Because if an argument is valid, the premises transmit truth to the conclusion on the assumption of the truth of the premises. But if the premises are actually true, as they are in a sound argument, then since all sound arguments are valid, we know that the conclusion of a sound argument is true. Compare the last two Obama examples from the previous section. While the first argument was sound, the second argument was not sound, although it was valid. The relationship between soundness and validity is easy to specify: all sound arguments are valid arguments, but not all valid arguments are sound arguments.

Although soundness is what any argument should aim for, we will not be talking much about soundness in this book. The reason for this is that the only difference between a valid argument and a sound argument is that a sound argument has all true premises. But how do we determine whether the premises of an argument are actually true? Well, there are lots of ways to do that, including using Google to look up an answer, studying the relevant subjects in school, consulting experts on the relevant topics, and so on. But none of these activities have anything to do with logic, per se. The relevant disciplines to consult if you want to know whether a particular statement is true is almost never logic! For example, logic has nothing to say regarding whether or not protozoa are animals or whether there are predators that aren't in the animal kingdom. In order to learn whether those statements are true, we'd have to consult biology, not logic. Since this is a logic textbook, however, it is best to leave the question of what is empirically true or false to the relevant disciplines that study those topics. And that is why the issue of soundness, while crucial for any good argument, is outside the purview of logic.

1.7 Deductive vs. Inductive arguments

The concepts of validity and soundness that we have introduced apply only to the class of what are called "deductive arguments". A deductive argument is an argument whose conclusion is supposed to follow from its premises with absolute certainty, thus leaving no possibility that the conclusion doesn't follow from the premises. For a deductive argument to fail to do this is for it

to fail as a deductive argument. In contrast, an inductive argument is an argument whose conclusion is supposed to follow from its premises with a high level of probability, which means that although it is possible that the conclusion doesn't follow from its premises, it is unlikely that this is the case. Here is an example of an inductive argument:

> Tweets is a healthy, normally functioning bird and since most healthy, normally functioning birds fly, Tweets probably flies.

Notice that the conclusion, Tweets probably flies, contains the word "probably." This is a clear indicator that the argument is supposed to be inductive, not deductive. Here is the argument in standard form:

1. Tweets is a healthy, normally functioning bird
2. Most healthy, normally functioning birds fly
3. Therefore, Tweets probably flies

Given the information provided by the premises, the conclusion does seem to be well supported. That is, the premises do give us a strong reason for accepting the conclusion. This is true even though we can imagine a scenario in which the premises are true and yet the conclusion is false. For example, suppose that we added the following premise:

> Tweets is 6 ft tall and can run 30 mph.

Were we to add that premise, the conclusion would no longer be supported by the premises, since any bird that is 6 ft tall and can run 30 mph, is not a kind of bird that can fly. That information leads us to believe that Tweets is an ostrich or emu, which are not kinds of birds that can fly. As this example shows, inductive arguments are defeasible arguments since by adding further information or premises to the argument, we can overturn (defeat) the verdict that the conclusion is well-supported by the premises. Inductive arguments whose premises give us a strong, even if defeasible, reason for accepting the conclusion are called, unsurprisingly, strong inductive arguments. In contrast, an inductive argument that does not provide a strong reason for accepting the conclusion are called weak inductive arguments.

Whereas strong inductive arguments are defeasible, valid deductive arguments aren't.

Suppose that instead of saying that most birds fly, premise 2 said that all birds fly.

Tweets is a healthy, normally function bird.

All healthy, normally functioning birds can fly.

Therefore, Tweets can fly.

This is a valid argument and since it is a valid argument, there are no further premises that we could add that could overturn the argument's validity. (True, premise 2 is false, but as we've seen that is irrelevant to determining whether an argument is valid.) Even if we were to add the premise that Tweets is 6 ft tall and can run 30 mph, it doesn't overturn the validity of the argument. As soon as we use the universal generalization, "all healthy, normally function birds can fly," then when we assume that premise is true and add that Tweets is a healthy, normally functioning bird, it has to follow from those premises that Tweets can fly. This is true even if we add that Tweets is 6 ft tall because then what we have to imagine (in applying our informal test of validity) is a world in which all birds, including those that are 6 ft tall and can run 30 mph, can fly.

Although inductive arguments are an important class of argument that are commonly used every day in many contexts, logic texts tend not to spend as much time with them since we have no agreed upon standard of evaluating them. In contrast, there is an agreed upon standard of evaluation of deductive arguments. We have already seen what that is; it is the concept of validity. In chapter 2 we will learn some precise, formal methods of evaluating deductive arguments. There are no such agreed upon formal methods of evaluation for inductive arguments. This is an area of ongoing research in philosophy. In chapter 3 we will revisit inductive arguments and consider some ways to evaluate inductive arguments.

1.9 Arguments with missing premises

Quite often, an argument will not explicitly state a premise that we can see is needed in order for the argument to be valid. In such a case, we can supply the premise(s) needed in order so make the argument valid. Making missing premises explicit is a central part of reconstructing arguments in standard form. We have already dealt in part with this in the section on

paraphrasing, but now that we have introduced the concept of validity, we have a useful tool for knowing when to supply missing premises in our reconstruction of an argument.

In some cases, the missing premise will be fairly obvious, as in the following:

> Gary is a convicted sex-offender, so Gary is not allowed to work with children.

The premise and conclusion of this argument are straightforward:

> Gary is a convicted sex-offender
>
> Therefore, Gary is not allowed to work with children (from 1)

However, as stated, the argument is invalid. (Before reading on, see if you can provide a counterexample for this argument. That is, come up with an imaginary scenario in which the premise is true and yet the conclusion is false.) Here is just one counterexample (there could be many): Gary is a convicted sex-offender but the country in which he lives does not restrict convicted sex-offenders from working with children. I don't know whether there are any such countries, although I suspect there are (and it doesn't matter for the purpose of validity whether there are or aren't). In any case, it seems clear that this argument is relying upon a premise that isn't explicitly stated. We can and should state that premise explicitly in our reconstruction of the standard form argument. But what is the argument's missing premise? The obvious one is that no sex- offenders are allowed to work with children, but we could also use a more carefully statement like this one:

> Where Gary lives, no convicted sex-offenders are allowed to work with children.

It should be obvious why this is a more "careful" statement. It is more careful because it is not so universal in scope, which means that it is easier for the statement to be made true. By relativizing the statement that sex-offenders are not allowed to work with children to the place where Gary lives, we leave open the possibility that other places in the world don't have this some restriction. So even if there are other places in the world where convicted sex-offenders are allowed to work with children, our statements could still be true since in this place (the place where Gary lives) they aren't. (For more on strong and weak statements, see section 1.10). So here is the argument in standard form:

1. Gary is a convicted sex-offender.
2. Where Gary lives, no convicted sex-offenders are allowed to work with children.
3. Therefore, Gary is not allowed to work with children. (from 1-2)

This argument is now valid: there is no way for the conclusion to be false, assuming the truth of the premises. This was a fairly simple example where the missing premise needed to make the argument valid was relatively easy to see. As we can see from this example, a missing premise is a premise that the argument needs in order to be as strong as possible. Typically, this means supplying the statement(s) that are needed to make the argument valid. But in addition to making the argument valid, we want to make the argument plausible. This is called “the principle of charity.” The principle of charity states that when reconstructing an argument, you should try to make that argument (whether inductive or deductive) as strong as possible. When it comes to supplying missing premises, this means supplying the most plausible premises needed in order to make the argument either valid (for deductive arguments) or inductively strong (for inductive arguments).

Although in the last example figuring out the missing premise was relatively easy to do, it is not always so easy. Here is an argument whose missing premises are not as easy to determine:

> Since children who are raised by gay couples often have psychological and emotional problems, the state should discourage gay couples from raising children.

1. The conclusion of this argument, that the state should not allow gay marriage, is apparently supported by a single premise, which should be recognizable from the occurrence of the premise indicator, “since.” Thus, our initial reconstruction of the standard form argument looks like this:
   Children who are raised by gay couples often have psychological and emotional problems.
2. Therefore, the state should discourage gay couples from raising children.

However, as it stands, this argument is invalid because it depends on certain missing premises. The conclusion of this argument is a normative statement— a statement about whether something ought to be true, relative to some standard of evaluation. Normative statements can be contrasted with descriptive statements, which are simply factual claims about what is true. For example, “Russia does not allow gay couples to raise children” is a descriptive statement.

That is, it is simply a claim about what is in fact the case in Russia today. In contrast, “Russia should not allow gay couples to raise children” is a normative statement since it is not a claim about what is true, but what ought to be true, relative to some standard of evaluation (for example, a moral or legal standard). An important idea within philosophy, which is often traced back to the Scottish philosopher David Hume (1711-1776), is that statements about what ought to be the case (i.e., normative statements) can never be derived from statements about what is the case (i.e., descriptive statements). This is known within philosophy as the is-ought gap. The problem with the above argument is that it attempts to infer a normative statement from a purely descriptive statement, violating the is-ought gap. We can see the problem by constructing a counterexample. Suppose that in society x it is true that children raised by gay couples have psychological problems. However, suppose that in that society people do not accept that the state should do what it can to decrease harm to children. In this case, the conclusion, that the state should discourage gay couples from raising children, does not follow. Thus, we can see that the argument depends on a missing or assumed premise that is not explicitly stated.

That missing premise must be a normative statement, in order that we can infer the conclusion, which is also a normative statement. There is an important general lesson here: Many times an argument with a normative conclusion will depend on a normative premise which is not explicitly stated. The missing normative premise of this particular argument seems to be something like this:

> The state should always do what it can to decrease harm to children.

Notice that this is a normative statement, which is indicated by the use of the word “should.” There are many other words that can be used to capture normative statements such as: good, bad, and ought. Thus, we can reconstruct the argument, filling in the missing normative premise like this:

1. Children who are raised by gay couples often have psychological and emotional problems.
2. The state should always do what it can to decrease harm to children.
3. Therefore, the state should discourage gay couples from raising children. (from 1-2)

However, although the argument is now in better shape, it is still invalid because it is still possible for the premises to be true and yet the conclusion false. In order to show this, we just have to imagine a scenario in which both the premises are true and yet the conclusion is false. Here is one counterexample to the argument (there are many). Suppose that while it is true that children of gay couples often have psychological and emotional problems, the rate of psychological problems in children raised by gay couples is actually lower than in children raised by heterosexual couples. In this case, even if it were true that the state should always do what it can to decrease harm to children, it does not follow that the state should discourage gay couples from raising children. In fact, in the scenario I've described, just the opposite would seem to follow: the state should discourage heterosexual couples from raising children.

But even if we suppose that the rate of psychological problems in children of gay couples is higher than in children of heterosexual couples, the conclusion still doesn't seem to follow. For example, it could be that the reason that children of gay couples have higher rates of psychological problems is that in a society that is not yet accepting of gay couples, children of gay couples will face more teasing, bullying and general lack of acceptance than children of heterosexual couples. If this were true, then the harm to these children isn't so much due to the fact that their parents are gay as it is to the fact that their community does not accept them. In that case, the state should not necessarily discourage gay couples from raising children. Here is an analogy: At one point in our country's history (if not still today) it is plausible that the children of black Americans suffered more psychologically and emotionally than the children of white Americans. But for the government to discourage black Americans from raising children would have been unjust, since it is likely that if there was a higher incidence of psychological and emotional problems in black Americans, then it was due to unjust and unequal conditions, not to the black parents, per se. So, to return to our example, the state should only discourage gay couples from raising children if they know that the higher incidence of psychological problems in children of gay couples isn't the result of any kind of injustice, but is due to the simple fact that the parents are gay.

Thus, one way of making the argument (at least closer to) valid would be to add the following two missing premises:

> The rate of psychological problems in children of gay couples is higher than in children of heterosexual couples.
>
> The higher incidence of psychological problems in children of gay couples is not due to any kind of injustice in society, but to the fact that the parents are gay.

So the reconstructed standard form argument would look like this:

1. Children who are raised by gay couples often have psychological and emotional problems.
2. The rate of psychological problems in children of gay couples is higher than in children of heterosexual couples.
3. The higher incidence of psychological problems in children of gay couples is not due to any kind of injustice in society, but to the fact that the parents are gay.
4. The state should always do what it can to decrease harm to children.
5. Therefore, the state should discourage gay couples from raising children. (from 1-4)

In this argument, premises 2-4 are the missing or assumed premises. Their addition makes the argument much stronger, but making them explicit enables us to clearly see what assumptions the argument relies on in order for the argument to be valid. This is useful since we can now clearly see which premises of the argument we may challenge as false. Arguably, premise 4 is false, since the state shouldn't always do what it can to decrease harm to children. Rather, it should only do so as long as such an action didn't violate other rights that the state has to protect or create larger harms elsewhere.

The important lesson from this example is that supplying the missing premises of an argument is not always a simple matter. In the example above, I have used the principle of charity to supply missing premises. Mastering this skill is truly an art (rather than a science) since there is never just one correct way of doing it (cf. section 1.5) and because it requires a lot of skilled practice.

Exercise 6: Supply the missing premise or premises needed in order to make the following arguments valid. Try to make the premises as plausible as possible while making the argument valid (which is to apply the principle of charity).

1. Ed rides horses. Therefore, Ed is a cowboy.
2. Tom was driving over the speed limit. Therefore, Tom was doing something wrong.
3. If it is raining then the ground is wet. Therefore, the ground must be wet.
4. All elves drink Guinness, which is why Olaf drinks Guinness.
5. Mark didn't invite me to homecoming. Instead, he invited his friend Alexia. So he must like Alexia more than me.

6. The watch must be broken because every time I have looked at it, the hands have been in the same place.
7. Olaf drank too much Guinness and fell out of his second story apartment window. Therefore, drinking too much Guinness caused Olaf to injure himself.
8. Mark jumped into the air. Therefore, Mark landed back on the ground.
9. In 2009 in the United States, the net worth of the median white household was $113,149 a year, whereas the net worth of the median black household was $5,677. Therefore, as of 2009, the United States was still a racist nation.
10. The temperature of the water is 212 degrees Fahrenheit. Therefore, the water is boiling.
11. Capital punishment sometimes takes innocent lives, such as the lives of individuals who were later found to be not guilty. Therefore, we should not allow capital punishment.
12. Allowing immigrants to migrate to the U.S. will take working class jobs away from working class folks. Therefore, we should not allow immigrants to migrate to the U.S.
13. Prostitution is a fair economic exchange between two consenting adults. Therefore, prostitution should be allowed.
14. Colleges are more interested in making money off of their football athletes than in educating them. Therefore, college football ought to be banned.
15. Edward received an F in college Algebra. Therefore, Edward should have studied more.

1.10 Assuring, guarding and discounting

As we have seen, arguments often have complex structures including subarguments (recall that a subargument is an argument for one of the premises of the main argument). But in practice people do not always give further reasons or argument in support of every statement they make. Sometimes they use certain rhetorical devices to cut the argument short, or to hint at a further argument without actually stating it. There are three common strategies for doing this:

Assuring: informing someone that there are further reasons although one is not giving them now

Guarding: weakening one's claims so that it is harder to show that the claims are false

Discounting: anticipating objections that might be raised to one's claim or argument as a way of dismissing those objections.

We will discuss these in order, starting with assuring. Why would we want to assure our audience? Presumably when we make a claim that isn't obvious and that the audience may not be inclined to believe. For example, if I am trying to convince you that the United States is one of the leading producers of CO2 emissions, then I might cite certain authorities such as the Intergovernmental Panel on Climate Change (IPCC) as saying so. This is one way of assuring our audience: by citing authorities. There are many ways to cite authorities, some examples of which are these:

Dentists agree that...

Recent studies have shown...

It has been established that...

Another way of assuring is to comment on the strength of one's own convictions. The rhetorical effect is that by commenting on how sure you are that something is true, you imply, without saying, that there must be very strong reasons for what you believe—assuming that the audience believes you are a reasonable person, of course. Here are some ways of commenting on the strength of one's beliefs:

I'm certain that...

I'm sure that...

I can assure you that...

Over the years, I have become convinced that...

I would bet a million dollars that...

Yet another way of assuring one's audience is to make an audience member feelthat it would be stupid, odd, or strange to deny the claim one is making. One common way to do this is by implying that every sensible person would agree with the claim. Here are some examples:

Everyone with any sense agrees that...

Of course, no one will deny that...

There is no question that...

No one with any sense would deny that...

Another common way of doing this is by implying that no sensible person would agree with a claim that we are trying to establish as false:

It is no longer held that...

No intelligent person would ever maintain that...

You would have to live under a rock to think that...

Assurances are not necessarily illegitimate, since the person may be right and may in fact have good arguments to back up the claims, but the assurances are not themselves arguments and a critical thinker will always regard them as somewhat suspect. This is especially so when the claim isn't obviously true. Next, we will turn to guarding. Guarding involves weakening a claim so that it is easier to make that claim true. Here is a simple contrast that will make the point. Consider the following claims:

A. All U.S. Presidents were monogamous

B. Almost all U.S. Presidents were monogamous

C. Most U.S. Presidents were monogamous

D. Many U.S. Presidents were monogamous

E. Some U.S. Presidents were monogamous

The weakest of these claims is E, whereas the strongest is A and each claims descending from A-E is increasingly weaker. It doesn't take very much for E to be true: there just has to be at least one U.S. President who was monogamous. In contrast, A is much less likely than E to be true because it require every U.S. President to have been monogamous. One way of thinking about this is that any time A is true, it is also true that B-E is true, but B-E could be true without A being true. That is what it means for a claim to be stronger or weaker. A weak claim is more

likely to be true whereas a strong claim is less likely to be true. E is much more likely to be true than A. Likewise, D is somewhat more likely to be true than C, and so on.

So, guarding involves taking a stronger claim and making it weaker so there is less room to object to the claim. We can also guard a claim by introducing a probability clause such as, “it is possible that...” and “it is arguable that...” or by reducing our level of commitment to the claim, such as moving from “I know that x” to “I believe that x.” One common use of guarding is in reconstructing arguments with missing premises using the principle of charity (section 1.9). For example, if an argument is that “Tom works for Merrill Lynch, so Tom has a college degree,” the most charitable reconstruction of this argument would fill in the missing premise with “most people who work for Merrill Lynch have college degrees” rather than “everyone who works for Merrill Lynch has a college degree.” Here we have created a more charitable (plausible) premise by weakening the claim from “all” to “most,” which as we have seen is a kind of guarding.

Finally, we will consider discounting. Discounting involves acknowledging an objection to the claim or argument that one is making, while dismissing that same objection. The rhetorical force of discounting is to make it seem as though the argument has taken account of the objections—especially the ones that might be salient in a person’s mind. The simplest and most common way of discounting is by using the “A but B” locution. Contrast the following two

claims:

A. The worker was inefficient, but honest.

B. The worker was honest, but inefficient.

Although each statement asserts the same facts, A seems to be recommending the worker, whereas B doesn’t. We can imagine A continuing: “And so the manager decided to keep her on the team.” We can imagine B continuing: “Which is why the manager decided to let her go.” This is what we can call the “A but B” locution. The “A but B” locution is a form of discounting that introduces what will be dismissed or overridden first and then follows it by what is supposed to be the more important consideration. By introducing the claim to be dismissed, we are discounting that claim. There are many other words that can be used as discounting words

instead of using “but.” Table 2 below gives a partial list of words and phrases that commonly function as discounting terms.

although	even if	but	nevertheless
though	while	however	nonetheless
even though	whereas	yet	still

Exercise 7: Which rhetorical techniques (assuring, guarding, discounting) are being using in the following passages?

1. Although drilling for oil in Alaska will disrupt some wildlife, it is better than having to depend on foreign oil, which has the tendency to draw us into foreign conflicts that we would otherwise not be involved in.
2. Let there be no doubt: the entity that carried out this attack is a known terrorist organization, whose attacks have a characteristic style—a style that is seen in this attack today.
3. Privatizing the water utilities in Detroit was an unprecedented move that has garnered a lot of criticism. Nonetheless, it is helping Detroit to recover from bankruptcy.
4. Most pediatricians agree that the single most important factor in childhood obesity is eating sugary, processed foods, which have become all too common in our day and age.
5. Although not every case of AIDS is caused by HIV, it is arguable that most are.
6. Abraham Lincoln was probably our greatest president since he helped keep together a nation on the brink of splintering into two.
7. No one with any sense would support Obamacare.
8. Even if universal healthcare is expensive, it is still the just thing to do.
9. While our country has made significant strides in overcoming explicit racist policies, the wide disparity of wealth, prestige and influence that characterize white and black Americans shows that we are still implicitly a racist country.
10. Recent studies have show that there is no direct link between vaccines and autism.

1.11 Evaluative language

Yet another rhetorical technique that is commonly encountered in argumentation is the use of evaluative language to influence one’s audience to accept the conclusion one is arguing for.

Evaluative language can be contrasted with descriptive language. Whereas descriptive language simply describes a state of affairs, without passing judgment (positive or negative) on that state of affairs, evaluative language is used to pass some sort of judgment, positive or negative, on something. Contrast the following two statements:

Bob is tall.

Bob is good.

“Tall” is a descriptive term since being tall is, in itself, neither a good nor bad thing. Rather, it is a purely descriptive term that does not pass any sort of judgment, positive or negative, on the fact that Bob is tall. In contrast, “good” is a purely evaluative term, which means that the only thing the word does is make an evaluation (in this case, a positive evaluation) and doesn’t carry any descriptive content. “Good,” “bad,” “right,” and “wrong” are examples of purely evaluative terms. A more interesting kind of term is one that is partly descriptive and partly evaluative. For example:

Bob is nosy.

“Nosy” is a negatively evaluative term since to call someone nosy is to make a negative evaluation of them—or at least of that aspect of them. But it also implies a descriptive content, such as that Bob is curious about other people’s affairs. We could re-describe Bob’s nosiness using purely descriptive language: Bob is very curious about other people’s affairs.

Notice that while the phrase “very curious about other people’s affairs” does capture the descriptive sense of “nosy,” it doesn’t capture the evaluative sense of nosy, since it doesn’t carry with it the negative connotation that “nosy” does.

Evaluative language is rife in our society, perhaps especially so in political discourse. This isn’t surprising since by using evaluative language to describe certain persons, actions, or events we can influence how people understand and interpret the world. If you can get a person to think of someone or some state of affairs in terms of a positively or negatively evaluative term, chances

are you will be able to influence their evaluation of that person or state of affairs. That is one of the rhetorical uses of evaluative language. Compare, for example,

Bob is a rebel.

Bob is a freedom fighter.

Whereas “rebel” tends to be a negatively evaluative term, “freedom fighter,” at least for many Americans, tends to be a positively evaluative term. Both words, however, have the same descriptive content, namely, that Bob is someone who has risen in armed resistance to an existing government. The difference is that whereas “rebel” makes a negative evaluation, “freedom fighter” makes a positive evaluation. Table 3 below gives a small sampling of some evaluative terms.

Beautiful	dangerous	wasteful
sneaky	cute	murder
prudent	courageous	timid
nosy	sloppy	smart
capable	insane	curt

English contains an interesting mechanism for turning positively evaluative terms into negative evaluative ones. All you have to do is put the word “too” before a positively evaluative terms and it will all of a sudden take on a negative connotation. Compare the following:

John is honest.

John is too honest.

Whereas “honest” is a positively evaluative term, “too honest” is a negatively evaluative term. When someone describes John as “too honest,” we can easily imagine that person going on to describe how John’s honesty is actually a liability or negative trait. Not so when he is simply described as honest. Since the word “too” indicates an excess, and to say that something is an excess is to make a criticism, we can see why the word “too” changes the valence of an evaluation from positive to negative.

Like assuring and discounting (section 1.10), using evaluative language to try to influence one's audience is a rhetorical technique. As such, it is more concerned with non-rational persuasion than it is with giving reasons. Non-rational persuasion is ubiquitous in our society today, not the least of which because advertising is ubiquitous and advertising today almost always uses non-rational persuasion. Think of the last time you saw some commercial present evidence for why you should buy their product (i.e., never) and you will realize how pervasive this kind of rhetoric is.

Philosophy has a complicated relationship with rhetoric—a relationship that stretches back to Ancient Greece. Socrates disliked those, such as the Sophists, who promised to teach people how to effectively persuade someone of something, regardless of whether that thing was true. Although some people might claim that there is no essential difference between giving reasons for accepting a conclusion and trying to persuade by any means, most philosophers, including the author of this text, think otherwise. If we define rhetoric as the art of persuasion, then although argumentation is a kind of rhetoric (since it is a way of persuading), not all rhetoric is argumentation. The essential difference, as already hinted at, is that argumentation attempts to persuade by giving reasons whereas rhetoric attempts to persuade by any means, including non-rational means. If I tell you over and over again (in creative and subliminal ways) to drink Beer x because Beer x is the best beer, then I may very well make you think that Beer x is the best beer, but I have not thereby given you an argument that Beer x is the best beer. Thinking of it rationally, the mere fact that I've told you lots of times that Beer x is the best beer gives you no good reason for believing that Beer x is in fact the best beer.

The rhetorical devices surveyed in the last two sections—especially assuring, discounting and the use of evaluative language—may be effective ways of persuading people, but they are not the same thing as offering an argument. And if we attempt to see them as arguments, they turn out to be typically pretty poor arguments. One of the many things that psychologists study is how we are persuaded to believe or do things. As an empirical science, psychology attempts to describe and explain the way things are, in this case, the processes that lead us to believe or act as we do. Logic, in contrast, is not an empirical science. Logic is not trying to tell us how we do think, but what good thinking is and, thus, how we ought think. The study of logic is the study of the nature of arguments and, importantly, of what distinguishes a good argument from a bad one. "Good" and "bad" are what philosophers call normative concepts because they involve standards of evaluation.

Since logic concerns what makes something a good argument, logic is sometimes referred to as a normative science. They key standard of evaluation of arguments that we have seen so far is that of validity. In chapter 2 we will consider some more precise, formal methods of understanding validity. Other “normative sciences” include ethics (the study of what a good life is and how we ought to live) and epistemology (the study of what we have good reason to believe).

1.12 Analyzing a real-life argument

In this section I will analyze a real-life argument—an excerpt from President Obama’s September 10, 2013 speech on Syria. I will use the concepts and techniques that have been introduced in this chapter to analyze and evaluate Obama’s argument. It is important to realize that regardless of one’s views— whether one agrees with Obama or not—one can still analyze the structure of the argument and even evaluate it by applying the informal test of validity to the reconstructed argument in standard form. I will present the excerpt of Obama’s speech and then set to work analyzing the argument it contains. In addition to creating the excerpt, the only addition I have made to the speech is numbering each paragraph with Roman numerals for ease of referring to specific places in my analysis of the argument.

> I. My fellow Americans, tonight I want to talk to you about Syria, why it matters and where we go from here. Over the past two years, what began as a series of peaceful protests against the repressive regime of Bashar al-Assad has turned into a brutal civil war. Over a hundred thousand people have been killed. Millions have fled the country. In that time, America has worked with allies to provide humanitarian support, to help the moderate opposition and to shape a political settlement.
>
> II. But I have resisted calls for military action because we cannot resolve someone else's civil war through force, particularly after a decade of war in Iraq and Afghanistan.
>
> III. The situation profoundly changed, though, on Aug. 21st, when Assad's government gassed to death over a thousand people, including hundreds of children. The images from this massacre are sickening, men, women, children lying in rows, killed by poison gas, others foaming at the mouth, gasping for breath, a father clutching his dead

children, imploring them to get up and walk. On that terrible night, the world saw in gruesome detail the terrible nature of chemical weapons and why the overwhelming majority of humanity has declared them off limits, a crime against humanity and a violation of the laws of war.

IV. This was not always the case. In World War I, American GIs were among the many thousands killed by deadly gas in the trenches of Europe. In World War II, the Nazis used gas to inflict the horror of the Holocaust. Because these weapons can kill on a mass scale, with no distinction between soldier and infant, the civilized world has spent a century working to ban them. And in 1997, the United States Senate overwhelmingly approved an international agreement prohibiting the use of chemical weapons, now joined by 189 governments that represent 98 percent of humanity.

V. On Aug. 21st, these basic rules were violated, along with our sense of common humanity.

VI. No one disputes that chemical weapons were used in Syria. The world saw thousands of videos, cellphone pictures and social media accounts from the attack. And humanitarian organizations told stories of hospitals packed with people who had symptoms of poison gas.

VII. Moreover, we know the Assad regime was responsible. In the days leading up to Aug. 21st, we know that Assad's chemical weapons personnel prepared for an attack near an area where they mix sarin gas. They distributed gas masks to their troops. Then they fired rockets from a regime-controlled area into 11 neighborhoods that the regime has been trying to wipe clear of opposition forces.

VIII. Shortly after those rockets landed, the gas spread, and hospitals filled with the dying and the wounded. We know senior figures in Assad's military machine reviewed the results of the attack. And the regime increased their shelling of the same neighborhoods in the days that followed. We've also studied samples of blood and hair from people at the site that tested positive for sarin.

IX. When dictators commit atrocities, they depend upon the world to look the other way until those horrifying pictures fade from memory. But these things happened. The facts cannot be denied.

X. The question now is what the United States of America and the international community is prepared to do about it, because what happened to those people, to those children, is not only a violation of international law, it's also a danger to our security.

XI. Let me explain why. If we fail to act, the Assad regime will see no reason to stop using chemical weapons.

XII. As the ban against these weapons erodes, other tyrants will have no reason to think twice about acquiring poison gas and using them. Over time our troops would again face the prospect of chemical warfare on the battlefield, and it could be easier for terrorist organizations to obtain these weapons and to use them to attack civilians.

XIII. If fighting spills beyond Syria's borders, these weapons could threaten allies like Turkey, Jordan and Israel.

XIV. And a failure to stand against the use of chemical weapons would weaken prohibitions against other weapons of mass destruction and embolden Assad's ally, Iran, which must decide whether to ignore international law by building a nuclear weapon or to take a more peaceful path.

XV. This is not a world we should accept. This is what's at stake. And that is why, after careful deliberation, I determined that it is in the national security interests of the United States to respond to the Assad regime's use of chemical weapons through a targeted military strike. The purpose of this strike would be to deter Assad from using chemical weapons, to degrade his regime's ability to use them and to make clear to the world that we will not tolerate their use. That's my judgment as commander in chief.

The first question to ask yourself is: What is the main point or conclusion of this speech? What conclusion is Obama trying to argue for? This is no simple question and in fact requires a good level of reading comprehension in order to answer it correctly. One of the things to look for is conclusion or premise indicators (section 1.2). There are numerous conclusion indicators in the speech, which is why you cannot simply mindlessly look for them and then assume the first one you find is the conclusion. Rather, you must rely on your comprehension of the speech to truly find the main conclusion. If you carefully read the speech, it is clear that Obama is trying to convince the American public of the necessity of taking military action against the Assad regime in Syria. So the conclusion is going to have to have something to do with that. One clear statement of what looks like a main conclusion comes in paragraph 15 where Obama says:

> And that is why, after careful deliberation, I determined that it is in the national security interests of the United States to respond to the Assad regime's use of chemical weapons through a targeted military strike.

The phrase, “that is why,” is a conclusion indicator which introduces the main conclusion. Here is my paraphrase of that conclusion:

> Main conclusion: It is in the national security interests of the United States to respond to Assad’s use of chemical weapons with military force.

Before Obama argues for this main conclusion, however, he gives an argument for the claim that Assad did use chemical weapons on his own civilians. This is what is happening in paragraphs 1-9 of the speech. The reasons he gives for how we know that Assad used chemical weapons include:

• images of the destruction of women and children (paragraph VI)

• humanitarian organizations’ stories of hospitals full of civilians suffering from symptoms of exposure to chemical weapons (paragraph VI)

• knowledge that Assad’s chemical weapons experts were at a site where sarin gas is mixed just a few days before the attack (paragraph VII)

• the fact that Assad distributed gas masks to his troops (paragraph VII)

• the fact that Assad's forces fired rockets into neighborhoods where there were opposition forces (paragraph VII)

• senior military officers in Assad's regime reviewed results of the attack (paragraph VIII)

• the fact that sarin was found in blood and hair samples from people at the site of the attack (paragraph VIII)

These premises do indeed provide support for the conclusion that Assad used chemical weapons on civilians, but it is probably best to see this argument as a strong inductive argument, rather than a deductive argument. The evidence strongly supports, but does not compel, the conclusion that Assad was responsible. For example, even if all these facts were true, it could be that some other entity was trying to set Assad up. Thus, this first subargument should be taken as a strong inductive argument (assuming the premises are true, of course), since the truth of the premises would increase the probability that the conclusion is true, but not make the conclusion absolutely certain.

Although Obama does give an argument for the claim that Assad carried out chemical weapon attacks on civilians, that is simply an assumption of the main argument. Moreover, although the conclusion of the main argument is the one I have indicated above, I think there is another, intermediate conclusion that Obama argues for more directly and that is that if we don't respond to Assad's use of chemical weapons, then our own national security will be put at risk. We can clearly see this conclusion stated in paragraph 10. Moreover, the very next phrase in paragraph 11 is a premise indicator, "let me explain why." Obama goes on to offer reasons for why failing to respond to Assad's use of chemical weapons would be a danger to our national security. Thus, the conclusion Obama argues more directly for is:

> Intermediate conclusion: A failure to respond to Assad's use of chemical weapons is a threat to our national security.

So, if that is the conclusion that Obama argues for most directly, what are the premises that support it? Obama gives several in paragraphs 11-14:

A. If we don't respond to Assad's use of chemical weapons, then Assad's regime will continue using them with impunity. (paragraph 11)

B. If Assad's regime uses chemical weapons with impunity, this will effectively erode the ban on them. (implicit in paragraph 12)

C. If the ban on chemical weapons erodes, then other tyrants will be more likely to attain and use them. (paragraph 12)

D. If other tyrants attain and use chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield (paragraph 12)

E. If we don't respond to Assad's use of chemical weapons and if fighting spills beyond Syrian borders, our allies could face these chemical weapons. (paragraph 13)

F. If Assad's regime uses chemical weapons with impunity, it will weaken prohibitions on other weapons of mass destruction. (paragraph 14)

G. If prohibitions on other weapons of mass destruction are weakened, this will embolden Assad's ally, Iran, to develop a nuclear program. (paragraph 14)

I have tried to make explicit each step of the reasoning, much of which Obama makes explicit himself (e.g., premises A-D). The main threats to national security that failing to respond to Assad would engender, according to Obama, are that U.S. troops and U.S. allies could be put in danger of facing chemical weapons and that Iran would be emboldened to develop a nuclear program. There is a missing premise that is being relied upon for these premises to validly imply the conclusion. Here is a hint as to what that missing premise is: Are all of these things truly a threat to national security? For example, how is Iran having a nuclear program a threat to our national security? It seems there must be an implicit premise—not yet stated—that is to the effect that all of these things are threats to national security. Here is one way of construing that missing premise:

Missing premise 1: An increased likelihood of U.S. troops or allies facing chemical weapons on the battlefield or Iran becoming emboldened to develop a nuclear program are all threats to U.S. national security interests.

We can also make explicit within the standard form argument other intermediate conclusions that follow from the stated premises. Although we don't have to do this, it can be a helpful thing

to do when an argument contains multiple premises. For example, we could explicitly state the conclusion that follows from the four conditional statements that are the first four premises:

1. If we don't respond to Assad's use of chemical weapons, then Assad's regime will continue using them with impunity.
2. If Assad's regime uses chemical weapons with impunity, this will effectively erode the ban on them.
3. If the ban on chemical weapons erodes, then other tyrants will be more likely to attain and use them.
4. If other tyrants attain and use chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield.
5. Therefore, if we don't respond to Assad's use of chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield. (from 1-4)

Premise 5 is an intermediate conclusion that makes explicit what follows from premises 1-4 (which I have represented using parentheses after that intermediate conclusion). We can do the same thing with the inference that follows from premises, 1, 7, and 8 (i.e., line 9). If we add in our missing premises then we have a reconstructed argument for what I earlier called the "intermediate conclusion" (i.e., the one that Obama most directly argues for):

1. If we don't respond to Assad's use of chemical weapons, then Assad's regime will continue using them with impunity.
2. If Assad's regime uses chemical weapons with impunity, this will effectively erode the ban on them.
3. If the ban on chemical weapons erodes, then other tyrants will be more likely to attain and use them.
4. If other tyrants attain and use chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield.
5. Therefore, if we don't respond to Assad's use of chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield. (from 1-4)
6. If we don't respond to Assad's use of chemical weapons and if fighting spills beyond Syrian borders, our allies could face these chemical weapons.
7. If Assad's regime uses chemical weapons with impunity, it will weaken prohibitions on other weapons of mass destruction.

8. If prohibitions on other weapons of mass destruction are weakened, this will embolden Assad's ally, Iran, to develop a nuclear program.
9. Therefore, if we don't respond to Assad's use of chemical weapons, this will embolden Assad's ally, Iran, to develop a nuclear program. (from 1, 7-8)
10. An increased likelihood of U.S. troops or allies facing chemical weapons on the battlefield or Iran becoming emboldened to develop a nuclear program are threats to U.S. national security interests.
11. Therefore, a failure to respond to Assad's use of chemical weapons is a threat to our national security. (from 5, 6, 9, 10)

As always, in this standard form argument I've listed in parentheses after the relevant statements which statements those statements follow from. The only thing now missing is how we get from this intermediate conclusion to what I earlier called the main conclusion. The main conclusion (i.e., that it is in national security interests to respond to Assad with military force) might be thought to follow directly. But it doesn't. It seems that Obama is relying on yet another unstated assumption. Consider: even if it is true that we should respond to a threat to our national security, it doesn't follow that we should respond with military force. For example, maybe we could respond with certain kinds of economic sanctions that would force the country to submit to our will.

Furthermore, maybe there are some security threats such that responding to them with military force would only create further, and worse, security threats. Presumably we wouldn't want our response to a security threat to create even bigger security threats. For these reasons, we can see that Obama's argument, if it is to be valid, also relies on missing premises such as these:

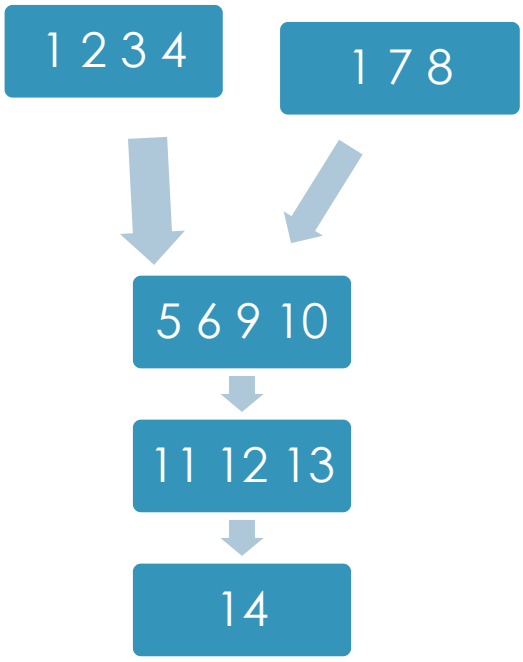
> Missing premise 2: The only way that the United States can adequately respond to the security threat that Assad poses is by military force.
>
> Missing premise 3: It is in the national security interests of the United States to respond adequately to any national security threat.

These are big assumptions and they may very well turn out to be mistaken. Nevertheless, it is important to see that the main conclusion Obama argues for depends on these missing premises—premises that he never explicitly states in his argument. So here is the final,

reconstructed argument in standard form. I have italicized each missing premise or intermediate conclusion that I have added but that wasn't explicitly stated in Obama's argument.

1. If we don't respond to Assad's use of chemical weapons, then Assad's regime will continue using them with impunity.
2. If Assad's regime uses chemical weapons with impunity, this will effectively erode the ban on them.
3. If the ban on chemical weapons erodes, then other tyrants will be more likely to attain and use them.
4. If other tyrants attain and use chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield.
5. Therefore, if we don't respond to Assad's use of chemical weapons, U.S. troops will be more likely to face chemical weapons on the battlefield. (from 1-4)
6. If we don't respond to Assad's use of chemical weapons and if fighting spills beyond Syrian borders, our allies could face these chemical weapons.
7. If Assad's regime uses chemical weapons with impunity, it will weaken prohibitions on other weapons of mass destruction.
8. If prohibitions on other weapons of mass destruction are weakened, this will embolden Assad's ally, Iran, to develop a nuclear program.
9. Therefore, if we don't respond to Assad's use of chemical weapons, this will embolden Assad's ally, Iran, to develop a nuclear program. (from 1, 7-8)
10. An increased likelihood of U.S. troops or allies facing chemical weapons on the battlefield or Iran becoming emboldened to develop a nuclear program are threats to U.S. national security interests.
11. Therefore, a failure to respond to Assad's use of chemical weapons is a threat to our national security. (from 5, 6, 9, 10)
12. The only way that the United States can adequately respond to the security threat that Assad poses is by military force.
13. It is in the national security interests of the United States to respond adequately to any national security threat.
14. Therefore, it is in the national security interests of the United States to respond to Assad's use of chemical weapons with military force. (from 11-13)

n addition to showing the structure of the argument by use of parentheses which show which statements follow from which, we can also diagram the arguments spatially as we did in section 1.4 like this:



his is just another way of representing what I have already represented in the standard form argument, using parentheses to describe the structure. As is perhaps even clearer in the patial representation of the argument's structure, this argument is complex in that it has numerous subarguments. So while statement 11 is a premise of the main argument for the main conclusion (statement 14), statement 11 is also itself a conclusion of a subargument whose premises are statements 5, 6, 9, and 10. And although statement 9 is a premise in that argument, it itself is a conclusion of yet another subargument whose premises are statements 1, 7 and 8. Almost any interesting argument will be complex in this way, with further subarguments in support of the premises of the main argument.

This chapter has provided you the tools to be able to reconstruct arguments like these. As we have seen, there is much to consider in reconstructing a complex argument. As with any skill, a true mastery of it requires lots of practice. In many ways, this skill is more like an art than a science.

Academic Skill: Focus on Lecture

Now that you've finished reading the textbook chapter on Logic, you will listen to several lectures. Remember the three kinds of lectures and how they may relate to information in a textbook.

They are…

Hand-in-Hand lectures: These lectures are right over the material in the books. They are called hand-in-hand since they "walk" side by side with the book—what you read about in the books for the courses is the same material you are hearing about in lecture.

Jumping off Point lectures: these lectures "jump off" from the book material. They bring in materials you cannot read about in the book—they may expand on ideas in the book or provide examples of concepts in the book.

Combination lectures: Some instructors will combine both Hand-in-hand and Jumping off point lectures. Others will use one type of lecture for some chapters in a semester and another type for other chapters.

As a reminder, here the the strategies to choose from as you listen to the lectures in this chapter.

Activity	
Warm-up	To warm up your brain before a lecture, look over the notes you took on the textbook chapter. What might be the subjects of these lectures based on the titles?
Work out	Choose a format for notetaking. You might want to try something different than the previous formats that you've used before.

Cool Down	To cool down in lectures means to review your notes within 24 hours of taking them. Information from lectures is easy to forget, so the sooner you review them, the better.

Warming up for Notetaking

1. Get the right equipment: Notetaking is very low-tech. All you need is a notebook and a pen.
2. Date your notes.
3. Title your notes.

Working out During Notetaking

Choose the method that you'll use for these lectures. Some students love the Cornell method, other like to take simple narrative notes. Others like to use outlines or mind maps. Whatever method you choose, your notetaking system must have three features:

- It must allow you to clearly record main ideas from a lecture
- It must be "sustainable." It is impossible to write down every word your instructor says. Therefore, you need to develop a method of taking notes that allows you to record a great deal of information quickly—this may involve developing a series of abbreviations,
- It must produce reviewable notes. The notes you take during a lecture are supposed to be like a second textbook for your class. They are useless if you cannot use them to study for exams or do other assignments for the class. Your notes need to be legible, and have enough information that, when you go back, you can make sense of what you wrote.

Don't forget to

- Abbreviate
- Listen for Phrases that Help You Set Goals
- Listen for Transitions

You are ready! Here are the lectures.

1. Diane Benscoter

How Cults Rewire the Brain

Diane Benscoter spent five years as a "Moonie." She shares an insider's perspective on the mind of a cult member, and proposes a new way to think about today's most troubling conflicts and extremist movements.

Diane Benscoter, an ex-Moonie, is now invested in finding ways to battle extremist mentalities and their potentially deadly consequences.

https://www.ted.com/talks/ex_moonie_diane_benscoter_how_cults_think

2. Rebecca Newberger Goldstein and Steven Pinker
   The Long Reach of Reason

Here's a TED first: an animated Socratic dialog! In a time when irrationality seems to rule both politics and culture, has reasoned thinking finally lost its power? Watch as psychologist Steven Pinker is gradually, brilliantly persuaded by philosopher Rebecca Newberger Goldstein that reason is actually the key driver of human moral progress, even if its effect sometimes takes generations to unfold.

https://www.ted.com/talks/steven_pinker_and_rebecca_newberger_goldstein_the_long_reach_of_reason

3. Daniel H. Cohen
   For Argument's Sake

Why do we argue? To out-reason our opponents, prove them wrong, and, most of all, to win! Right? Philosopher Daniel H. Cohen shows how our most common form of argument -- a war in which one person must win and the other must lose -- misses out on the real benefits of engaging in active disagreement.

https://www.ted.com/talks/daniel_h_cohen_for_argument_s_sake

Cooling Down After the Lecture

The notes you take are like another book for your class. You need to use them like you would a book to study for your class, which mean that your notes have to have some of the same qualities a book does. Here are some ways to organize your notes:

- Create an “index.”
- Use a highlighter to mark important terms.
- Use a different colored pen and/or highlighters to go back to your notes and make your own headings and subheadings.
- Tab your notes.

Having well-organized notes is a great start, but it isn’t quite enough. After you organize your notes, you need to review them. Here are some ways to review your notes:

- Ask yourself why your instructor decided to lecture over this material in the way that he or she chose to do. What type of lecture is it? Hand-in-Hand or Jumping-off-point? Why do you suppose he or she chose to deliver that type of lecture to the class today? How does the lecture relate to other course materials you have to read for the course?

- Make sure you understood the lecture itself. When you review, pretend you need to tell a classmate who missed the lecture what the main ideas were. Actually explain the notes—either out loud or silently.

- Add additional notes of explanation you didn’t get a chance to add in class. Make sure you understand any abbreviations you might have used.

- Identify concepts that were not clear to you. Mark confusing parts up with questions marks and find a classmate, a tutor, or your instructor to get the concepts clarified.

- Share notes with a classmate. What did he or she write down? How is it different from what you wrote down? What can you add to one another’s notes?

Academic Skill 2: Focus on Writing

Now that you've read the textbook chapter on Logic and watched several lectures on similar subjects, you're ready to write the essay.

In this activity, you will write an argument essay. You can find prompts using this link.

https://learning.blogs.nytimes.com/2015/02/05/301-prompts-for-argumentative-writing/

There are 301 prompts, so you have a lot of freedom. However, in addition to writing an excellent essay, this essay will also be graded on the reasoning. Have you applied the concepts from the textbook chapter to the supporting points in your essay?

Let's take another quick look at the strategies you can use to write this essay.

Activity	
Warm-up	To warm up your brain, carefully read the prompt you were given for your paper. Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself "If a stranger were to read my paper over my shoulder, would it make sense?"

Structure for an Academic Essay

Introduction **Your introductory paragraph will have two main parts.**	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs **Each body paragraph will have three parts.**	*Part 1: Topic Sentenc*e- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.
	Part 2: Evidence- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.
	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence is should be taken seriously.

Conclusion **Your conclusion will have two parts.**	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

Warm up for Writing

Before you actually begin to write your paper, there are three things to consider that will help you decide how to approach your paper.

1) What were you told to do? Make sure to carefully read the prompt you were given. Does it give you information about what the instructor wants? Often, the prompt your instructor gave you will directly tell you what he or she is looking for. For example, if a prompt says, “In your introductory paragraph, summarize Smith’s theory of education . . . .” then you know that you will use summary in your introduction.

2) What are your goals? If your goal is to explain how an experience you had in high school caused you to realize you want to become a physical therapist, then you need to use narrative to explain what happened to you.

3) What are your preferences? If the prompt does not provide you with information about what strategy to use, and several strategies might help you achieve your goal, then you can choose the goal that work best for you.

Working Out while Writing a Paper

The charts below describe the strategies you might use in three parts of your paper—the establishing authority part of the introduction, the evidence part of the body paragraph and the evaluation part of the body paragraph. Your job will be to select the strategies that are most likely to help you achieve your goal.

Strategies for Establishing Authority Remember, the goal of establishing authority is to provide the reader with the information they need to understand your paper and prove to them that you are worth listening to. The following strategies will help you do that.	
Summary	If you are responding to an essay, a video, a lecture or a book, you might choose to summarize its main ideas. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

The chart below lists different strategies you can choose from when you present evidence in your body paragraphs. Notice that many of the strategies are the same ones you can use to establish authority.

Strategies for Presenting Evidence Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.	
Summary	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.

Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

The chart below lists the strategies you can use when you evaluate your body paragraph. Remember, EACH body paragraph needs it's own evaluation. The strategies below are possible ways you can evaluate your paragraph.

Strategies for Evaluating Your Paragraph Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?
How is the information presented in the evidence part of the paragraph related?	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else change as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the “Structure of an Academic Essay” graphic and go through your paper section by section. Do you establish authority? Do you have a thesis statement where it belongs? Do you have a topic sentence for each body paragraph? Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructor’s expectations.

Eventually, your instructor will read your rough draft and provide comments for you. You will then have to revise. It is not uncommon for students to re-write papers five or six times before “getting it right.” Be patient with the revision process!

Academic Skill: Focus on Discussions

After writing your paper, you will participate in the following type of discussion.

Evaluation Discussion- An evaluation discussion focuses on evaluating another student's work. Students are often particularly hostile to evaluation discussion because they feel they are grading one another's work—which is the instructor's job, not theirs. They may think, "I barely understand this myself, why should I have to comment on someone else's work?" They may say "Only the instructor's opinion matters since that is where my grade comes from. Who cares what my classmates, who are as clueless as me, think?" However, your instructor sees evaluation discussions very differently. You will be asked to read and comment on one another's essays.

The purpose of an evaluation discussion is to help students develop judgment about what is and is not effective work. Usually, this means applying ideas you have learned in the class about effective writing, problem solving, etc. to that students works. You've now learned about using logic to support an argument and written an essay supporting your own argument. You will now read another student's essay to determine whether the support is actually supporting the argument proposed in the essay.

Also, when you leave the class, you will have to actually use whatever you learned in the class on your own—for example, when you complete your composition class, you are expected to write an academic essay on your own. Evaluation discussion provide you will practice being independent and using your new skills while your instructor is still nearby to help you if you get confused.

	Activity
Warm-up	Review the notes you have taken on the textbook and lectures about logic. What will you need to be looking for in another student's essay? How will you know if the support the student is using is logical?
Work out	To work out in a discussion is to fully participate in the discussion by devoting you full energy into understanding and doing what your instructor is asking of

	you. It also means listening carefully to classmates and committing to the idea of saying something yourself.
Cool Down	To cool down after a discussion is to simply think carefully about which of the three purposes (or which combination of purposes) your discussion served. Ask yourself "What was I supposed to get out of this discussion?" Answering that question will help you determine what you instructor thinks is important.

Warming Up for Discussion

In order to get the most out of a discussion make sure you review the notes you have taken on the textbook and lectures about logic. What will you need to be looking for in another student's essay? How will you know if the support the student is using is logical?

Your instructor might say something like "On Monday, we will have a workshop over your papers" Most instructors expect you to come to class with your papers written. What they hope to accomplish during class time is to have you ask questions about what you did not understand or to review other students' work so you can comment on what they did well and what they need to work on. These activities are impossible if you haven't done your homework ahead of time. However, sometimes students expect the class will be like a study hall where they can begin an assignment, or simply work on it on their own. In college study-hall like classes are fairly rare—since classes only meet two or three times a week, instructors generally expect you to actually do your homework outside class, while class time is usually spent either getting you ready to do homework and papers, getting you ready for exams or helping you evaluate work you have already done.

When the instructor expects students to peer review a paper they have not written or to discuss a chapter they have not read, this leads students to believe that these class days are simply a waste of time and that their instructor is boring. The truth is that the activity is a waste of time because the student is not prepared for the discussion. If a hockey player showed up for practice with no skates or pads, he or she would have to sit on the bench and watch everyone else practice. Practice will go on without him or her with the players that did show up prepared. This doesn't mean the practice itself is a waste of time or ineffective. It means that it was a

waste of time for the player who did not show up prepared. The same is true for your classes—if you show up prepared, you will get more out of class.

Working Out During a Discussion

Your instructor has an evaluation discussion when he or she wants you to provide feedback to other students in the class on something they have done—like a paper or an art project. Of course, you should also receive feedback from other students. Your instructor has these kinds of discussions because he or she wants to give you opportunities to practice skills you have learned in the class so you will slowly but surely be able to do these things on your own. The question to ask yourself during an Evaluation discussion is, “Have a mastered these skills I am learning well enough to be able to apply them to my own work and the work of other students?”

Cooling Down After a Discussion

A cool down for a discussion is fairly straightforward. When you are doing your homework for the class later on, ask yourself these questions:

“What did my instructor want us to get out of today’s discussion?” Jot down all the answers you could think of. You might say “My instructor wants us to learn how supply-demand graphs work” or “My instructor wanted to know how well we understood cell division.”

Next ask yourself, “How will the concepts I learned in this discussion help me achieve future goals in the class?” Again, jot down your answers. You might say “My instructor wants us to learn how supply-demand graphs work because we will have to do them on the exam in two weeks.”

Finally, ask yourself how confident you are that you understand not only why you had this sort of discussion, but if you mastered the skills or concepts you were working with.

Chapter 6: Human Rights

	Purpose
Warm-up	Your brain actually remembers information better if it warms up. You warm up your brain by preparing it for the academic activity that it must do. If you are preparing for a discussion, for example, you can ask yourself, "Why is my instructor going to have a discussion? What do they hope I will 'get out' of this discussion?"
Work out	In academics, the purpose of the workout is to learn the material you need to know in order to be successful in the class. This might involve reading, jotting down ideas you might wish to share in discussion, or taking notes on a lecture.
Cool Down	In academics, the purpose of a cool down is to do two things—one, make some decisions about what you did during your workout that is important enough to remember and two, plan ahead. What will you need to study tomorrow? What confuses you and how can you get help with your confusion?

Warm Up:

What is the United Nations?

What does "human rights" mean to you?

Do you have human rights?

What human rights do you think you have?

Academic Skill: Focus on Lecture

	Activity
Warm-up	Predict the subject and content of the lecture by reading about the speaker and looking at the title.
Work out	Take notes using the strategies and methods you find work best for you.
Cool Down	Review your notes.

Warming up for Notetaking

- Make sure you have a pen and paper
- Date your notes.
- Title your notes.

Working out During Notetaking

-
- Choose your favorite method to take notes on the lectures in this chapter.

Don't forget to…

- Abbreviate
- Listen for Phrases that Help You Set Goals
- Listen for Transitions

Watch and take notes on the following video about The Story of Human Rights.

http://www.youthforhumanrights.org/what-are-human-rights.html

Divide up the following videos on 30 Videos on 30 Rights. Choose to watch five of the short videos on the 30 Human Rights from this link.

http://www.youthforhumanrights.org/what-are-human-rights.html

Watch the following videos on Ted.com and take notes.

Jimmy Carter – Why I Believe the Mistreatment of Women is the Number One Human Rights Abuse

https://www.ted.com/talks/jimmy_carter_why_i_believe_the_mistreatment_of_women_is_the_number_one_human_rights_abuse

Mary Robinson – Why Climate Change is a Threat to Human Rights

https://www.ted.com/talks/mary_robinson_why_climate_change_is_a_threat_to_human_rights/transcript

Peter Gabriel – Fighting Injustice with Video

https://www.ted.com/talks/peter_gabriel_fights_injustice_with_video/transcript

Oren Yakobovich – Hidden Cameras that Film Injustice in the World's Most Dangerous Place

https://www.ted.com/talks/oren_yakobovich_hidden_cameras_that_film_injustice_in_the_world_s_most_dangerous_places/transcript

Auret Van Heerden – Making Global Labor Fair

https://www.ted.com/talks/auret_van_heerden_making_global_labor_fair/transcript

Will Potter – The Secret U.S. Prisons You've Never Heard of Before

https://www.ted.com/talks/will_potter_the_secret_us_prisons_you_ve_never_heard_of_before/transcript

Kevin Bales – How to Combat Modern Slavery

https://www.ted.com/talks/kevin_bales_how_to_combat_modern_slavery/transcript

Cooling Down After the Lecture

Organize your notes.

- Create an "index."
- Use a highlighter to mark important terms.
- Use a different colored pen and/or highlighters to go back to your notes and make your own headings and subheadings.
- Tab your notes.

Review your notes.

- Why is this lectures included in this chapter?

- Make sure you understood the lecture itself. When you review, pretend you need to tell a classmate who missed the lecture what the main ideas were. Actually explain the notes—either out loud or silently.

- Add additional notes of explanation you didn't get a chance to add in class. Make sure you understand any abbreviations you might have used.

- Identify concepts that were not clear to you. Mark confusing parts up with questions marks and find a classmate, a tutor, or your instructor to get the concepts clarified.

- Share notes with a classmate. What did he or she write down? How is it different from what you wrote down? What can you add to one another's notes?

Academic Skill: Focus on Reading

	Activity
Warm-up	To warm up your brain, spend a few minutes looking over the material you need to read. Read the headings and subheadings. Look at graphics and pictures if there are any. Ask yourself "What will I be learning in this reading?" "What ideas seem to be important?"
Work out	To work out in reading, you need to read! But it isn't that simple. You need to have a note taking strategy that will allow you to do two things: 1) Figure out what information is most important and 2) Remember that information.
Cool Down	To cool down in reading, see what you can remember about the reading by stating main ideas in your own words, telling a friend what you learned or asking yourself "Which ideas did I read tonight are so important they might end up on an exam?" You can also make a list of things that confused you that you can ask your instructor or a tutor.

Take a look at the structure of the readings in this chapter.

Does the author seem to be comparing and contrasting two or more people, ideas, places, processes or events? Does the author seem to be describing a process? Does the author seem to be defining important terms or concepts?

What is the Purpose- the second thing to consider about anything you read is what is YOUR purpose for reading the material? Will you have to write a paper over it? Participate in a class discussion? Take a multiple choice test over it? Take an essay test over it? What you will have DO with the information you read should help you determine what strategies you should use to get the most out of your reading.

Consider your own Preferences- The final thing to consider is your preferences. Once you have determined the structure of the reading and thought through the purpose, the last factor you can weigh in is how you would like to take notes—which strategies are the most effective for you? Which ones seem to fit your learning style the best?

Warm up

The three strategies described below should be used before you actually read. You might wish to do just one strategy, or it might make sense to use more than one.

Pre-Reading Strategy 1: The Planner's Bookmark	The first pre-reading strategy you can use is to make a plan for completing your reading. You can make a bookmark with the following information to keep in your textbook or book. There questions about studying in a group if you join a study or tutor group. **Chapter Information** What will I need to know when I finish reading? _____. How many pages and/or sections are there? _____ **Group Information if you're reading in a group.** This group will meet again on _____. By then, I will need to read ___ pages and ___ sections. **Time Management** *Date_____ Time I began reading_____ Time I ended_____ # of pages completed_____

Pre-Reading Strategy 2: The Foundation Builder	Before you begin to read, turn headings into questions and write them down in your notebook. You know you have read successfully when you can answer the questions.

Pre-Reading Strategy 3: Reviewer	Read over notes you took yesterday. Then, find a pen that is a different color than the one you used to take the notes. Write a sentence or two that summarize important ideas from those notes at the top of the page. If parts of your notes confuse you, make sure to note that with a symbol, like a question mark.

Work out

Strategy 1: **Connector**	As you read new sections of your textbook or book you need to relate the new information you are learning to what you already know. **How does this section fit into the book?** How does this section connect to the previous section? Introduces a topic that: ➢ Supports the big main idea ➢ Describes another step in a process you are learning ➢ Describes events in the order in which they occur ➢ Other:_____ **How does section this relate to the lectures?**

	Does the lecture expand on ideas brought up in the book? Does the lecture cover different materials altogether? Does the lecture go over the book directly?

Strategy 2: **Illustrator**	Are you learning about a process or are you learning about events as they happened? Make a timeline. Do you have theories to learn or people to keep straight? Make a chart to keep track of their similarities and differences. Do you need to learn the differences and similarities between terms, ideas, people or processes? Make a Venn diagram. Do you need to remember a concept that has a number of examples? Make a mind map.

Strategy 3: **Note taker**	Will you use matrix notes, graphic organizers, Cornell notes, outline style or other notetaking strategy. If you feel that one of these note taking strategies would fit the material well, take notes in one of these styles.

Strategy 4: **Vocabulary Detector**	Don't simply copy terms and their definitions from your book! Instead, make new terms easier to learn by examining how they relate to one another, the topic of the section, and the title of the section.

	Define terms in your own words by pretending you need to explain them to ninth grade class. Think of your own examples and sentences to show how to use these new words.

Here are the articles to read for this chapter.

Read and listen to Eleanor Roosevelt on the Declaration of Human Rights.

http://www.americanrhetoric.com/speeches/eleanorrooseveltdeclarationhumanrights.htm

Reading #2 and #3: The following are each an overview of Human Rights.

https://hreusa.org/hre-library/topics/human-rights/background/

http://hrlibrary.umn.edu/edumat/hreduseries/tb1b/Section1/tb1-2.htm

Reading #3:

http://hrlibrary.umn.edu/edumat/becominghuman/index.html

Reading #4: An Alternative Viewpoint

https://www.theguardian.com/news/2014/dec/04/-sp-case-against-human-rights

Cool Down

Strategy 1: **The Summarizer**	After you finish reading a section or your textbook or a chapter in a book, make it into a neat package by summarizing it.

	Look through the chapter section for key words. They might be terms, but they might also be words that show how terms are related. Once you have written down key words, put those words in a few sentences that you write in your own words—close the book when you do this. Once you're finished, open it up again and re-read. What did you miss? What did you get right? Change and add to your summary until you've got it right. Key words: Summary without looking at the book: Summary after looking at the book and making changes:

Strategy 2: Test Buster	After you read this section of the chapter, go back and decide what questions might be asked over this material. Do your best to think up questions that will close to the kind of questions you will have to answer on the test. For example, if you will have to answer short answer questions on the test, think up short answer questions.

Academic Skill 2: Focus on Writing Academic Essays

	Activity
Warm-up	To warm up your brain, carefully read the prompt below. Think about these questions: What information should be in my introduction? What information should be in the body of my paper? How will I end my paper? Take a few notes about what you think you should do and then re-read the prompt. Do your ideas still seem to make sense?
Work out	To work out in writing, you need to write your paper! This will involve selecting strategies that will help you make your point most efficiently.
Cool Down	To cool down in writing re-read what you have written and re-read the prompt. Make sure your writing choices still fit the prompt. Ask yourself "If a stranger were to read my paper over my shoulder, would it make sense?"

Writing Prompt #1:

Read the following handout on Human Rights.

http://hrlibrary.umn.edu/edumat/hreduseries/tb1b/Section2/imagine_a_countryH1.html

You may choose to answer any or all of the following questions in your essay. Make sure to structure your answers as an essay. If you have forgotten what that might look like, review the structure of a college essay.

- Do you think this statistical evidence is biased and misrepresents your country? Which statistics in particular are you concerned about?

- How do you explain the apparent contradictions, (e.g., richest nation but high percentage of poverty that exist in the United States)?

- For which social and economic rights does the USA appear to be doing well? For which is there need for substantial improvement?

- What is the responsibility of the government to ensure that everyone achieves these human rights as fully as possible? Are there some conditions, such as inadequate nutrition of children, that the government should address and other conditions, such as homelessness of adults, that it shouldn't? What actions might the government take?

- Who besides government should assume responsibilities for addressing human rights problems?

- Are there some conditions for which the statistics suggest that the USA is doing as well as might be expected and others for which we can expect better results? Do you think we can do better? What makes you think the way you do?

- Indicate your understanding of and feelings about one particular statement in Imagine a Country by writing a letter to a local newspaper

- Identify "Red flag facts." These are data that uncover inequalities in a situation and suggest that there might be unfair treatment involved. However, more information is usually needed before one can conclude that an inequality exists, (e.g., the percentage of males and females pursuing science careers) is the result of unfair treatment.

Source: Written by David Shiman.

Writing Prompt #2:

Choose just one of the human rights from the thirty outlined in the Universal Declaration of Human Rights. Research the background, develop a summary statement on the importance of this human right. Research the violations of this human right and describe them. Propose solutions to the problems.

Structure for an Academic Essay

Introduction **Your introductory paragraph will have two main parts.**	*Part 1: Establishing Authority*- When you establish authority, you are doing two things—1) convincing your readers that you are expert enough on the topic to be worth listening to and 2) providing them with the information they need to understand your paper. The Establishing authority part of your paper begins with the very first sentence and ends just before the thesis.
	Part 2: Thesis- The thesis statement is a sentence that tells the reader what you will prove in the paper. In shorter essays, the thesis sentence is always the last sentence of the introductory paragraph—just after the establishing authority.

Body Paragraphs **Each body paragraph will have three parts.**	*Part 1: Topic Sentenc*e- in most academic essays, the topic sentence is the very first sentence of the paragraph and it plays an important role. It makes a claim that the rest of the paragraph will prove or support.
	Part 2: Evidence- in an academic essay, the evidence section is the middle of the paragraph and longest part of the paragraph. Here is where you will actually work to convince your reader that the claim you made in your topic sentence is true.
	Part 3: Evaluation- In the academic essay, the evaluation usually comes at the end of the paragraph and it helps the reader understand why the evidence is should be taken seriously.

Conclusion **Your conclusion will have two parts.**	Conclusions sum up what you have already said. New information should not appear in a conclusion, although you may wish to leave your reader with something interesting to think about. *Part 1: Restate the thesis*- Here, all you need to do is go back to the thesis statement that is at the end of the first paragraph you wrote and state it again in your last paragraph with slightly different words.
	Part 2: Sum up main points- In this part of the conclusion, you just need to go back to each body paragraph and sum up its main point.

Warm up for Writing

Before you actually begin to write your paper, there are three things to consider that will help you decide how to approach your paper.

1. What were you told to do? Make sure to carefully read the prompt you were given. Does it give you information about what the instructor wants? Often, the prompt your instructor gave you will directly tell you what he or she is looking for. For example, if a prompt says, “In your introductory paragraph, summarize Smith’s theory of education . . . .” then you know that you will use summary in your introduction.

2. What are your goals? If your goal is to explain how an experience you had in high school caused you to realize you want to become a physical therapist, then you need to use narrative to explain what happened to you.

3. What are your preferences? If the prompt does not provide you with information about what strategy to use, and several strategies might help you achieve your goal, then you can choose the goal that work best for you.

Working Out while Writing a Paper

The charts below describe the strategies you might use in three parts of your paper—the establishing authority part of the introduction, the evidence part of the body paragraph and the evaluation part of the body paragraph. Your job will be to select the strategies that are most likely to help you achieve your goal.

Strategies for Establishing Authority Remember, the goal of establishing authority is to provide the reader with the information they need to understand your paper and prove to them that you are worth listening to. The following strategies will help you do that.	
Summary	If you are responding to an essay, a video, a lecture or a book, you might choose to summarize its main ideas. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story to establish authority. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes statistics, percentages, dates or a brief historical overview are the best way to help your reader not only understand the issue you are writing about, but to show them you know your stuff.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, they will see you as an expert.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.

The chart below lists different strategies you can choose from when you present evidence in your body paragraphs. Notice that many of the strategies are the same ones you can use to establish authority.

Strategies for Presenting Evidence Remember, the goal of presenting evidence is to provide the reader with the information they need to agree with the claims you are making in your paper. Evidence proves to the reader that what you are saying is true. The following strategies will help you do that. Note that many of the strategies are the same ones you can use to establish authority.	
Summary	If you would like to use the ideas in an essay, a video, a lecture or a book to help you prove your point, you will need to summarize its main ideas in the evidence part of your body paragraphs. This will help your reader understand the source you are responding to and prove that you are an expert—if you read a source and can summarize it, then you are an expert.
Narrative or short personal story	If you are writing an essay that relates in some way to your life or the life or someone you know, you might choose to tell a personal story for your evidence. Doing so will prove to your reader that, because you have lived this, you are an expert.
Facts and History	Sometimes using statistics, percentages, dates or a brief historical overview are the best evidence you can give your reader to help him/her see that your viewpoint is worth considering.
Definition	If you are writing about something your reader might not understand, define it so he or she will be able to understand your paper. When you are able to define a word or concept for your reader, your evidence will make much more sense.
Description	If you are writing an essay that relates to your personal life, you may choose to describe something significant to your life such as an object or an emotion.
Quotes from Experts	Sometimes the words of an expert is the best way for you to prove your point. Using quotes from sources is a great way to prove your point.
Compare/ Contrast	In the evidence part of your body paragraphs, you might choose to compare/ contrast two or more things, people, places, concepts or events in order to make your point.

The chart below lists the strategies you can use when you evaluate your body paragraph. Remember, EACH body paragraph needs it's own evaluation. The strategies below are possible ways you can evaluate your paragraph.

Strategies for Evaluating Your Paragraph Remember, the goal of the evaluation part of a paragraph is to explain to your reader why or how the evidence you presented proves the topic sentence you wrote. The following strategies will make it clear to your reader what exactly your evidence proves. In shorter academic essays, the evaluation is the last 2-4 sentences in a body paragraph.	
Why is this evidence important?	Explain why a person, concept, event, etc. is important. What will people be able to do or understand as a result of knowing the information you just presented?
How is the information presented in the evidence part of the paragraph related?	Sometimes readers don't understand the purpose of your paragraph unless you tell them directly. If your goal is to explain how two things are connected, similar or different, you will need to point that out at the end of your paragraph.
How did the information presented in the evidence in the evidence part of the paragraph affect me or someone else?	Explain how a person, event, idea, etc. affected a person, a group of people or a series of events. Sometimes, it isn't clear to a reader how something affected you (if you are writing a personal essay) or someone or something else until you explain it.
What did I learn as a result of the evidence presented? How did I change?	Explain what you or someone else learned or how you or someone else changed as a result of an experience.

Cooling down After Writing a Paper

After you write your paper, re-read it carefully. To do this, go back to the “Structure of an Academic Essay” graphic and go through your paper section by section. Do you establish authority? Do you have a thesis statement where it belongs? Do you have a topic sentence for each body paragraph? Do you present evidence and write an evaluation for each paragraph?

Finally, re-read the prompt. Make sure your paper meets the instructors expectations.

Eventually, your instructor will read your rough draft and provide comments for you. You will then have to revise. It is not uncommon for students to re-write papers five or six times before “getting it right.” Be patient with the revision process!

Academic Skill: Focus on Discussions

The last task of this chapter is a discussion. This discussion is a “Concept Check Discussion”.

Concept Check Discussion- The purpose of concept check discussions is to give students opportunities to practice discussing challenging concepts. The act of putting unfamiliar terms and concepts into your own words causes you to clarify your thinking and deepen your understanding. Listening to someone else describe a concept is less likely to lead to deep understanding than having to talk about it yourself. Think about it like this— If you want to learn to swim, you must actually swim. You can learn a little bit by listening to someone talk about swimming, or watching other people swim, but you really cannot learn to swim until you put on a bathing suit and jump in the water.

	Activity
Warm-up	Prepare by making sure your homework and readings are done as thoroughly as possible. In your notebook, jot down what you would like to get out of the discussion. For example, if you know you will be discussing, jot down what confuses you about it. You can also prepare questions ahead of time.
Work out	To work out in a discussion is to fully participate in the discussion by devoting you full energy into understanding and doing what your instructor is asking of you. It also means listening carefully to classmates and committing to the idea of saying something yourself.
Cool Down	To cool down after a discussion is to simply think carefully about which of the three purposes (or which combination of purposes) your discussion served. Ask yourself “What was I supposed to get out of this discussion?” Answering that question will help you determine what you instructor thinks is important.

Warming Up for Discussion

In order to get the most out of a discussion make sure you read all materials and do all assignments ahead of time. When students come to class without having read, they get confused quickly since the other students and the instructor are discussing terms and ideas they have not heard. The same is true for your classes—if you show up prepared, you will get more out of class.

Working Out During a Discussion

Your instructor has concept check discussion because he or she wants to give you practice talking about important ideas. That means one of two things:

1. Your instructor believes the material you are covering is essential to the class and you will benefit from an opportunity to ask questions and discuss ideas with others. His or her goal is that you will leave class with a good understanding of whatever was the subject of the discussion. He or she wants you to have this solid understanding because he or she knows it will be important later—the concepts you cover in that discussion will be essential to understanding the rest of the class.
2. Your instructor wants you to be able to discuss certain ideas in your own words, or develop your own opinion about some part of the subject matter. Your instructor rarely does this randomly—he or she wants you to be able to discuss certain ideas in your own words or develop your own opinion about certain ideas in order to prepare you for something you will do down the road such as write a paper, take an essay test or give a speech.

To get the most out of a Concept Check discussion, ask yourself: "What concepts and ideas seem to be really important to my instructor in this discussion? How confident am I that I understand these concepts? Do I understand this concept well enough to discuss it in my own words? Have I developed my own opinions about this concept?"

Cooling Down After a Discussion

A cool down for a discussion is fairly straightforward. When you are doing your homework for the class later on, ask yourself these questions:

“What did my instructor want us to get out of today’s discussion?” Jot down all the answers you could think of. You might say “My instructor wants us to learn how supply-demand graphs work” or “My instructor wanted to know how well we understood cell division.”

Next ask yourself, “How will the concepts I learned in this discussion help me achieve future goals in the class?” Again, jot down your answers.

Finally, ask yourself how confident you are that you understand not only why you had this sort of discussion, but if you mastered the skills or concepts you were working with.

Human Rights Discussion

- Do you think it is the UN's job to make statements about human rights or should it be the responsibility of individual governments? Why/why not?
- Is it really reasonable to try to give the same rights to everyone in the world? Why/why not?
- Which of the human rights do you personally think is the most important?
- How many human rights do you think are fully observed in your country? In the world?
- Which countries do you think have a particularly bad record on human rights?
- Some people think that they can influence another country's internal politics by boycotting its products or not visiting it as a tourist. How effective do you think this kind of action is?
- If you know that a country still applies the death penalty, would it influence you in any way regarding visiting it or buying its exports?
- Why do you think it is so difficult to apply/comply with the basic human rights?
- Do you think that a state which ignores human rights in order to, for example, fight terrorism, devalues its moral status? Can you think of any examples?
- How many Human rights do you think were violated at Guantánamo?
- Objections to the existing human rights
- In the US, some have argued that there should be a provision to prevent governments collecting taxes from those who do not wish to pay. How do you react to this suggestion?
- Although article two states "Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as ..... sex..."; it at no time explicitly makes any mention of gay rights. What would be the effect of adding gay rights to the Convention? What states and institutions would welcome such a change and which ones would object?

- Some states have criticized the granting of full religious freedom on the basis that their religion does not allow them to recognise other religions as equal. What do you think of the validity of this criticism?
- How would you respond to the suggestion that religion and human rights don't mix?
- Amnesty International has argued for an additional "Right to refuse to kill." What do you think would be the effect of adding such a clause?
- Limits to Human rights
- Should the right to free speech be unconditional?
- What about people who say things which have the objective of reducing the human rights of others? Racist propaganda? Fascist propaganda? Attempts to get one person to kill another?
- Should the right of association be unconditional?
- What about terrorist organizations? What about political parties which explicitly support terrorist organizations?

Appendix A

References for *Stress Introduction* Reading

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