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CHAPTER 2

1. An idea has to be novel or new because a researcher must be able to show how an idea adds to or builds upon the scientific literature.
2. (a) "Considering that millions of girls in the U.S. read these popular magazines (MPA, 2009), it is important to understand how this portrayal [as the "fun, fearless female"] influences self-image among girls."

   (b) "In this study, the authors advance current knowledge by testing (1) the extent to which parents are aware of and approve of the content in these magazines, and (2) the extent to which girls actively incorporate this portrayal into their own self-image."
3. Theory.
4. Begin your search with secondary sources because you can identify many potential primary sources in a single article making your search more efficient.
5. Five databases are: PsycInfo, PsycArticles, PubMed, ERIC, and JSTOR. Each database typically provides an abstract and reference information for each available article.
6. (a) This is an ethical example because the student read the full text of an abstract they found interesting. (b) This is an unethical example because the student failed to obtain the primary source that was cited in his paper.
7. Be comprehensive, be critical, and be clever.
8. The advantage is that you can filter through almost all the articles not relevant to your research topic by reading only the title and abstract.
9. (a) Deductive reasoning. (b) Inductive reasoning.
10. (a) "You notice that among your college friends, that those who are the most outgoing always seem to be dating. You conclude that being outgoing is necessary to get a date."

    (b) "Using this conclusion as your theory, you predict that more outgoing individuals are more likely to date."
11. A confirmational strategy is a method of testing a theory or hypothesis in which a positive result confirms the predictions made by that theory or hypothesis; whereas a disconfirmational strategy is a method of testing a theory or hypothesis in which a positive result disconfirms the predictions made by that theory or hypothesis.
12. To test predictions using the confirmational strategy we use logic that is not always true. For this reason, a confirmational strategy alone to test theories is not good practice.
13. The problem is that editors of peer-reviewed journals tend to preferentially accept articles that show positive results and reject those that show only negative results. Therefore, the size of an effect could be overstated for many behavioral phenomena reported in the peer-reviewed literature.

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Chapter 2: Generating Testable Ideas

Chapter Outline

2.1 Generating Interesting and Novel Ideas
2.2 Converting Ideas to Hypotheses and Theories
2.3 Developing Your Idea: Deduction and Induction
2.4 Performing a Literature Review
2.5 Ethics in Focus: Giving Proper Credit
2.6 The "3 Cs" of an Effective Literature Review
2.7 Testing Your Idea: Confirmation and Disconfirmation
2.8 Ethics in Focus: Publication Bias

Chapter Summary Organized by Learning Objectives

Key Terms
End-of-Chapter Problems
Review Questions
Activities

Learning objectives

After reading this chapter, you should be able to:

1. Explain what makes an idea interesting and novel.

2. Distinguish between a hypothesis and a theory.

3. Distinguish between induction and deduction.

4. Describe the process of conducting a literature review.

5. Identify four ethical concerns for giving proper credit.

6. Describe the "3 Cs" of conducting an effective literature review.

7. Distinguish between a confirmational and a disconfirmational strategy.

8. Explain the issue of publication bias.

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- A suggestion for meeting learning objectives. This book has been written as a teachable reference. You will find that the sections and chapters in this book are loaded with practical research examples and illustrations that can be easily incorporated into your lectures. An advantage of teaching from content in the textbook is that it will increase how often students reference and read the textbook. So incorporating the many examples and illustrations from the textbook into your lectures should have a positive effect on the readings many students complete. This is just something to keep in mind as you prepare your lectures.

Lecture suggestions in support of the learning objectives

Learning Objective 1 suggestions. Refer to Section 2.1 for this learning objective. In this section, you may find it helpful to review some research articles—maybe from your own research or from the literature in general. Find a few research articles, print them, and hand them out to students. This can give students their first familiarization with how a research article appears in a peer-reviewed journal. Try to make sure the journal you choose following APA format so that they can see the formatting style that will be later introduced to them in the course.

For each article that you review with students, have them find sentences that they feel indicate what makes the research interesting and novel. Have students defend their answer and ask other students to comment on whether they agree or disagree with the answers of other students. This exercise can get students engaged and involved in course material, get them to start reading an introduction to an APA research paper and clearly illustrate with some examples, the importance of stating what makes research interesting and novel. Also, please have them refer to Table 2.1, which gives students three examples of articles in which the authors of each article explicitly stated what makes their research interesting and novel.

Learning Objective 2 suggestions. Section 2.2 is a great reference for meeting this learning objective. Hypothesis and theory can often be difficult to distinguish and so it may be worth spending extra time discussing their differences. Also, you can refer to Figure 2.1 to illustrate the process of developing hypotheses and theories to explain behaviors and events. It will also be useful to explain how to identify good theories and hypotheses based on the three key described in the book: Testable/falsifiable, replicable/precise, and parsimonious.

Learning Objective 3 suggestion. Section 2.3 is a great reference for meeting this learning objective. It can be useful to open a discussion on induction and deduction with examples from published literature. To start, you can use the **Induction or Deduction** exercise, which pulls an example from a classic article published by B. F. Skinner in 1955. In the article, he describes his use of inductive and deductive reasoning to develop his ideas and test his hypotheses. The exercise can be used in class to stimulate conversation and get students thinking about how ideas are structured and formulated through the use of hypotheses and data collection. Also, have students refer to Figure 2.3 in the chapter. In

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this figure, students are shown how both types of reasoning can be used to arrive at the same hypothesis.

Learning Objective 4 suggestions. Section 2.4 is a great reference for meeting this learning objective. This section gives a step-by-step guide to conducting an online literature review. Students are shown what the *literature* is, the types of databases they can search and how the databases differ. In addition, students are shown how to organize their search to ensure that they can keep track of all sources and to be able to distinguish between primary and secondary sources.

Learning Objective 5 suggestions. Section 2.5 is a great reference for meeting this learning objective. A common concern among undergraduate students is that they do not have the appropriate level of experience in searching articles and citing sources. For this reason, I include this learning objective to review problems to avoid when performing a literature review and citing sources. Students should find this helpful for writing papers and for recognizing how to appropriate review and cite work in a literature review.

Learning Objective 6 suggestions. Section 2.6 is a great reference for meeting this learning objective. The "3 Cs" of an effective literature review are an organized and concise summary of key suggestions and tips for students performing a literature review. Many of the suggestions and tips that are included come from strategies used by some of the most famous psychologists in history; including two Noble Prize award winners. It may be worth the time to emphasize to students that the 3 Cs are proven techniques that can help them perform their literature reviews more efficiently.

Learning Objective 7 suggestions. Section 2.7 is a great reference for meeting this learning objective. The confirmational and disconfirmational strategies can be difficult for students to comprehend. For this reason, I use many examples and include an example in which both strategies are used with in the same design. I emphasize throughout Section 2.7 that both strategies should be used to test a hypothesis. In particular, have students refer to Figure 2.6 in the chapter. In this figure, students are shown how both strategies can be used within the same research design to test the same hypothesis.

Learning Objective 8 suggestions. Section 2.8 is a great reference for meeting this learning objective. The publication bias, also called the file drawer problem, means that the size of an effect could be overstated for many behavioral phenomena reported in the peer-reviewed literature. This problem is something important to emphasize ahead of introducing a psychological literature. I suggest that such a problem be acknowledged up front here to encourage students to critically evaluate the literature introduced throughout this book and in your course.

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Induction or Deduction

Below is a portion of an article written by B. F. Skinner in 1955. In the article, he describes his use of inductive and deductive reasoning to develop his ideas and test his hypotheses. In a paragraph, explain how the example given here illustrates inductive reasoning, deductive reasoning, or both.

"The Art of Finding One Thing While Looking for Something Else"

"I found [in my earlier work] that… the rate of responding [on a lever press for food]… suggested a scheme for keeping a rat at a constant level of deprivation. The argument when like this: Suppose you reinforce the rat, not at the end of a given period, but when it has completed the number of responses ordinarily emitted in that period. And suppose you use substantial pellets of food and give the rat continuous access to the lever. Then, except for periods when the rat sleeps, it should operate the lever at a constant rate around the clock. For, whenever it grows slightly hungry, it will work faster, get food faster, and become less hungry, while whenever it grows slightly less hungry, it will respond at a lower rate, get less food, and grow hungrier. By setting the reinforcement at a given number of responses [on a lever press] it should even be possible to hold the rat at any given level of deprivation. I visualized a machine with a dial which one could set to make available, at any time of day or night, a rat in a given state of deprivation. Of course, [after setting up an experiment to test this argument, I found that] nothing of the sort happens. As soon as I found out it produces a very different type of performance, [I had to revise my initial argument]" (pp. 226-227).

Source: Skinner, B. F. (1955). A case history in scientific method. *The American Psychologist, 11*, 221-233.

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Answers to the Induction or Deduction exercise:

A correct answer to this exercise will look something like the following [feel free also to have students expand on their answers and discuss the reasoning for their answers more meaningfully in class]:

Skinner proposed a rationale hypothesis for how to maintain a constant level of deprivation in rats, using indicative reasoning—based on what he observed or found in his earlier work. However, when he conducted an experiment, he observed that rats did not behave in ways consistent with his hypothesis and so he used inductive reasoning again to revise his hypothesis.

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RESEARCH METHODS for the BEHAVIORAL SCIENCES

SECOND EDITION

Chapter 2: Generating Testable Ideas

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Chapter Outline

- Generating interesting and novel ideas
- Converting ideas to hypotheses and theories
- Developing your idea: Deduction and induction
- Performing a literature review
- Ethics in Focus: Giving proper credit
- The "3 Cs" of an effective literature review
- Testing your idea: Confirmation and disconfirmation
- Ethics in Focus: Publication bias

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Generating Ideas

The object of research is to extend human knowledge beyond what is already known

Once a research study is complete, researchers will try to publish the results in a scientific journal, called a peer-reviewed journal

Peer reviewed journal: Type of publication that specifically publishes scientific articles, reviews, or commentaries only after the work has been reviewed by peers who determine its scientific value regarding publication. Only after acceptance from peer reviewers will a work be published

Generating Ideas

Two criteria of importance to publishing a work can be met by answering two questions:

- *Is my idea interesting?*
  - An interesting idea can potentially benefit society, test a prediction, or develop areas of research
  - Journals prefer to publish papers that are going to be widely read and useful to their readers
- *Is my idea novel?*
  - A novel idea is one that is original or new
  - You must be able to show how your idea adds to or builds upon the scientific literature

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Hypotheses and Theories

Hypothesis – A specific, testable claim or prediction about what you expect to observe given a set of circumstances

Theory – A broad statement used to account for an existing body of knowledge and also provide unique predictions to extend that body of knowledge

A theory is not necessarily correct; instead it is a generally accepted explanation for evidence, as it is understood

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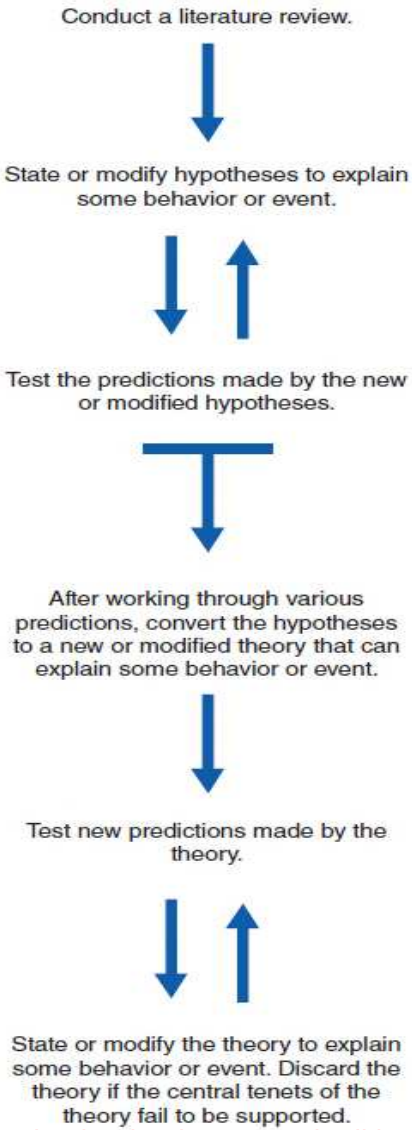
Figure 2.1 A General Pattern of Developing Hypotheses and Theories to Explain Behaviors and Events



Hypotheses and Theories

Three key criteria to consider when developing a good hypothesis or theory that is regarded as scientific:

- Testable/Falsifiable
  - A good theory or hypothesis must be stated in a way that makes it possible to reject it (i.e., it must be falsifiable).
- Replicable/Precise
  - The mechanisms (i.e., presumed causes) and outcomes in a hypothesis or theory should be clearly defined and be precise.
- Parsimonious
  - Simpler explanations should be preferred to more complex ones.

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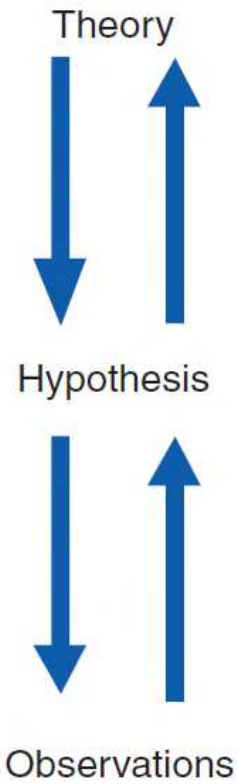
Developing Your Idea: Deduction and Induction

Figure 2.2 A Comparison of Deductive and Inductive Reasoning

Deduction. A "top-down" or "theory-driven" approach in which researchers begin with a specific claim or theory that generates predictions from which observations can be made to refute or support the claim or theory.



Induction. A "bottom-up" or "data-driven" approach in which researchers begin by making general observations that lead to patterns from which they formulate hypotheses that make testable predictions—leading to the development of a new theory.

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Developing Your Idea: Deduction and Induction

Figure 2.3 The Process of Deduction and Induction for the Same Problem

Theory: Students who sit in the front row are smarter than students who sit in the back row.

Deduction

Hypothesis/predicted observation: Students who sit in the front row will score higher on exams than students who sit in the back row.

Induction

Observation: You observe that three students sitting in the front row always score highest on exams.

In this example, both types of reasoning led to the same hypothesis.

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Performing a Literature Review

To develop an idea you must perform a literature review

The literature is the general body of published scientific knowledge

The *review* is the search you perform of this general body of knowledge

Key objective of the literature review is to develop new ideas that can be converted into a hypothesis that is interesting and novel

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Performing a Literature Review

Getting started: Choosing a research topic

Getting organized: Choosing appropriate sources

A *source* is any published or printed article, chapter, or book from which information can be obtained

To organize the sources and make a literature review more efficient:

- Begin with a search of review articles
- Search only from peer-reviewed or other scientific sources

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Performing a Literature Review

You can categorize sources as primary and secondary

Primary source: Any publication in which the works, ideas, or observations are those of the author

Secondary source: Any publication that refers to works, ideas, or observations that are not those of the author

Review articles provide a full summary of a research topic by an author who is regarded as an expert on that topic

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Performing a Literature Review

Each time you come across a secondary source:

Find the reference cited and read it for yourself. Make every effort to obtain the primary source for an article of interest.

In your review, keep track of secondary sources so you can find the primary source later

A secondary source is someone (e.g., the author of the review article) telling you what someone else (e.g., the original author of the work) observed

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Performing a Literature Review

Getting searching: Using online databases

Full-text article: Any article or text that is available in its full or complete published version

Full-text database: Any online database that makes full-text articles available to be downloaded electronically

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Performing a Literature Review

Table 2.2 Descriptions for Five Widely Used Online Databases in the Behavioral Sciences

Database	Description
PsycINFO	An abstract database containing more than 2.7 million records updated weekly, from more than 49 countries and in 29 languages. Ninety-nine percent of journals covered are peer reviewed from areas in psychology and related disciplines (American Psychological Association [APA], 2009).
PsycARTICLES	A full-text database containing more than 142,000 full-text articles in HTML or PDF updated weekly. Full-text articles cover 66 journals from 1894 to present in areas of psychology and related disciplines (APA, 2009).
PubMed	A comprehensive bibliographic and full-text database that contains nearly 19 million records updated weekly in the biomedical and life sciences from 1949 to present (U.S. National Library of Medicine, 2013).
ERIC	A bibliographic and full-text database that contains more than 1.2 million records, updated twice weekly for journal articles, books, conference and policy papers, technical reports, and other education-related materials (Educational Resource Information Center, n.d.).
JSTOR	A multidisciplinary database established in 1997, JSTOR covers disciplines in the arts and sciences, including 112 titles in psychology and related fields (ITHAKA, 2013).

Performing a Literature Review

General process for navigating databases using PsycINFO as an example

After logging into a database, you will see several search options under the advanced search tab.

To begin a search, select keywords for the database to search. Be thoughtful when choosing keywords.

Performing a Literature Review

You can limit your search to finding keywords anywhere in an article, by publication year, by author, and according to many other search options

To perform the search using the keywords and criteria you selected, click the "Search" option

Performing a Literature Review

Many sources are full text, and all should include at least an abstract

If the full-text article is available, download and save it

If it is not, saving the abstract and reference information will make it easier for you to find the full-text article later

If the source is not available electronically, it can likely be found using the interlibrary loan process at your college or university library

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Ethics in Focus: Giving Proper Credit

1. Always double-check your sources for accuracy.

- When referring to a secondary source, be sure to cite it properly and accurately

2. Obtain the primary source of an article you cite

- One way to find the primary source is to check the references of secondary sources

Four ways to avoid such ethical problems are the following:

3. Avoid "abstracting"

- Instances in which an individual cites the full reference of some work after simply skimming through an abstract

4. Be aware of citation bias

- Citation bias occurs when an author or authors cite only evidence that supports their view and fail to cite conflicting evidence

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The "3 Cs" of an Effective Literature Review

1. Be comprehensive – Perform a literature review in a minimum timeframe

- Search journals' archives
- Search multiple databases
- Read select portions of an article to determine whether it is relevant to your research topic
  - Search titles & abstracts first

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The "3 Cs" of an Effective Literature Review

Table 2.4 The Sections of Articles in Peer-Reviewed Journals

Section	Description
Title	A single sentence that captures the topic of a study
Abstract	A brief summary of the purpose and results of a study
Introduction	An overview of the research topic that explains how it is interesting and novel and identifies the hypotheses being tested
Method	A description of the materials, procedures, and participants or subjects in a study
Results	A summary of the statistical analyses that often includes figures and tables to summarize data
Discussion	The conclusion of the study that explains how the results of a study answered the hypotheses tested and sometimes offers ideas for future research
References	A listing for every source that was cited in the body of the article

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The "3 Cs" of an Effective Literature Review

2. Be Critical

- Ask questions: Ask yourself questions about the participants, methods or procedures, and conclusions
- Know your sources: Know where your information comes from
- Remain objective: Be aware of your own biases

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The "3 Cs" of an Effective Literature Review

3. Be Clever

- Five clever strategies to generate new ideas:
  - Identify flaws
  - Identify contradictions
  - Identify anomalies
  - Consider subtleties
  - Think beyond the research

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Testing Your Idea: Confirmation and Disconfirmation

Confirmational strategy

- A positive result confirms the predictions made by that theory or hypothesis
- Uses an "if…then" logic statement, represented as:
  - If A is true, then B is true
  - B is true.
  - Therefore, A is true.
- The problem with this type of logic, referred to as *affirming the consequent*, is that it can be fallacious or not true

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Testing Your Idea: Confirmation and Disconfirmation

Disconfirmational strategy

- A positive result disconfirms the predictions made by that theory or hypothesis
- A benefit of using this strategy is that we can refute a theory or hypothesis with a positive result
- Best strategy for refuting a theory

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Figure 2.6 Using Confirmational and Disconfirmational Strategies to Test a Theory

The aversion theory: Rat subjects will consume less of a flavored solution if it is associated with feeling sick.

Deduction

Deduction

Confirmational strategy: If the aversion theory (A) is true, then B will also be true. Therefore—if B, then A (the aversion theory is supported).

Disconfirmational strategy: If the aversion theory (A) is true, then C cannot be true (not C). Therefore—if C, then not A (the aversion theory is refuted).

Key:
A = The aversion theory.
B = Low intake of a flavored solution associated with sickness.
C = Low intake of a flavored solution not associated with sickness.

In this example, the aversion theory anticipates B—a confirmational strategy is used to test this outcome. But the aversion theory does not anticipate C—a disconfirmational strategy is used to test this outcome.

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Ethics in Focus: Publication Bias

Publication bias

- Tendency for editors of peer-reviewed journals to preferentially accept articles that show positive results and reject those that show only negative results
- Researchers conduct studies to observe an effect, or significant outcome of a study
- The failure to observe an effect means that few, if any, peer-reviewed journals will allow the study to be published, which can bias the literature toward only those studies that show positive results.

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