4 Library Resources

The library and its resources are central to a liberal education. Writing a research paper is inevitably a part of the college experience, and the research typically done by college students starts within the walls of the library. To write a research paper based on library materials requires learning two skills: finding pertinent material, and shaping that material into a coherent paper. This chapter discusses resources that are available in the library, first the resources generally useful to all disciplines and then some specialized resources useful to particular disciplines. In the following chapter we explain methods for recording, summarizing, documenting, and acknowledging what you find. These two chapters, then, deal with the basic skills needed for library research. In later chapters (6, 9, and 14) we discuss how to use these skills (and others) to put together a complete term paper in the humanities, the social sciences, and in the natural sciences.

The research process in the library

Much student library research is hit or miss. If you start by looking in a card catalog for books or by browsing at random in the stacks, the research that results is almost inevitably incomplete and insufficient for a good paper. If the sources you do find are not related to one another, the problem of organizing your material becomes enormous. In addition, students often tend to be too content oriented in their library searches; they concentrate on finding information on the topic and pay too little attention to the quality, quantity, or nature of the sources they use. Papers written as a result of such haphazard searches are marked by blandness, lack of substance, overgenerality, and overdependence on too few sources.

To avoid these traps, library research should be systematic and follow a carefully conceived strategy. In designing such a strategy for a particular project it is helpful to keep in mind two general characteristics of library research. The first is that in the library, topics are explored at two different levels. One deals with content, using materials that give you information

directly on the topic. The other level is bibliographical, the objective of which is not so much to get information on your topic as it is to find out what materials are available on the topic and some indication of the value of these materials. Efficiency in the use of your time in the library is a function of the interplay of these two levels. People who confine themselves to trial-and-error browsing in the stacks operate entirely at the content level. If they should find good sources, it is accidental, and they have no way of knowing if there are better sources available. It is more efficient to discover by a bibliographical search that a given book is not worthwhile than to spend time reading the whole book before you know. On the other side, of course, excessive time can be spent discovering what is available; at some point you must come to the content level and read on the substance of the topic.

Library research is made complex by the fact that these two levels are not completely successive. You do not typically first do a bibliographical search and then go to content. Library search should be thought of as a simultaneous, two-task process. The material that you are reading for content will also lead you to additional items for your bibliography, and items on your bibliography will lead you to new ideas about your subject matter. The process is continuing and self-perpetuating. An initial bibliographical search may indicate the name of a significant book. You read the book (content level) and find further references to other material (bibliographical level), which you then follow up. In addition, as you pursue the topic on the content level you may modify your understanding of the topic itself in a way that suggests new areas in which to conduct the bibliographical search.

A second characteristic of library research is that it typically proceeds from the general to the specific. As you proceed through the search, you will find your focus becoming increasingly narrowed until you finally get to the topic or aspect of the topic about which you will write. You can visualize the books and articles you need to read for your paper as contained in a circle surrounded by a series of concentric circles, each of which represents bibliographical aids of an increasing order of generality. If your topic is Dickens's *Hard Times*, then in the center circle are books and articles on *Hard Times*. The next circle out represents works on Dickens, more general than works on a novel by Dickens. The next circle would be bibliographies on Dickens—guides to materials on Dickens—then bibliographies of Victorian literature, and so on. The outermost circle represents guides to what is in the library (figure 4.1).

The research task is to get from the outermost circles to the innermost. Once the innermost has been reached, the bibliographical search is ended. If you know nothing about the library, you start at the outermost circle. If you don't need that, but you know little about Dickens, then start with the next circle—encyclopedias. Obviously, the farther in you can start, the faster the search, and where you start is dictated by your prior knowl-

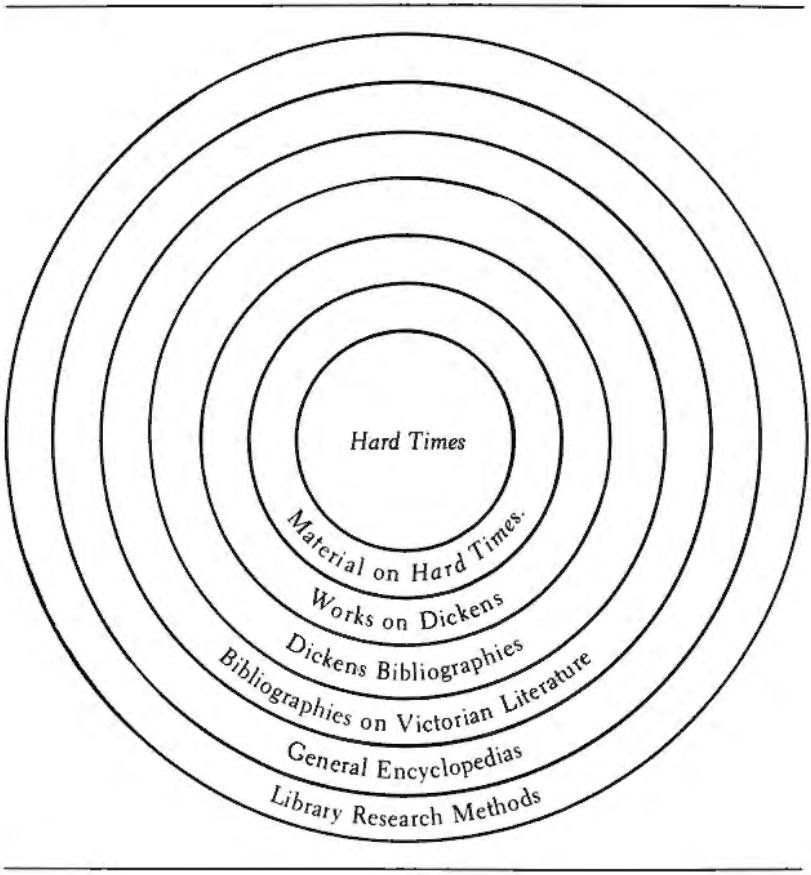


FIGURE 4.1
Order of generality in a search for literature on Dickens's Hard Times.

edge of the topic. In this respect, bibliographies are like maps. If you are looking for a small town in western Pennsylvania, and you know it is in Pennsylvania, it is more efficient to start with a map of Pennsylvania than with a map of the United States.

Before we describe the materials the library contains, it is worth mentioning a resource that you may overlook: the reference librarians. These are a special group of librarians whose sole function is to help you find what you need. They are best at telling you what reference works you can consult, particularly the more specialized reference materials.

The reference section

General encyclopedias. *Encyclopaedia Britannica*, *Encyclopedia Americana*, and *Collier's Encyclopedia* are general reference works organized alphabetically and usually in many volumes. They contain articles on a wide range of topics, but although they give bibliographies at the end of each entry, they are not designed primarily as a bibliography. Their purpose is to cover the subject of the entry as completely as possible within

the given space, and the references they make are usually to classic rather than to up-to-date works. Consequently, their primary use in library research is to give a very general overview of a topic. If you need a perspective on your topic, you might try an encyclopedia.

Using encyclopedias intelligently can yield more than a basic outline of information on the topic. For example, the most recent *Encyclopaedia Britannica* is divided into two parts, the Micropaedia and the Macropaedia. In the Micropaedia you will find brief information with directions on where to find more information in the Macropaedia. If you were researching Charles Dickens (see the Humanities section later in this chapter), you would discover in the Micropaedia a reference to "Dickens 5; 706" (meaning look up p. 706 of vol. 5 of the Macropaedia for the main entry on Dickens) and seven other references to related topics dealt with in the Macropaedia: English literature of the nineteenth century; the novel's attack on social abuses, and so on. These references collectively give you a good background from a variety of angles for your further reading and help you to begin to focus the topic.

Remember, your library search has two prongs: content and bibliography. While an encyclopedia can give you an introduction to a topic, it can also supply information on sources to read on the topic, that is, other places to search for information. The *Encyclopaedia Britannica* entry on Dickens, for example, lists four categories of books you may wish to consult: bibliographies, or books containing further lists of books on Dickens; biographies of Dickens; books of criticism of his works; and anthologies, or collections of essays on Dickens and his work. Consulting this general reference work gives you a good start.

Specialized encyclopedias. The *International Encyclopedia of the Social Sciences, Encyclopedia of Education Research, The Encyclopedia of the Biological Sciences, Encyclopedia of World Art, Encyclopedia of Philosophy, New Oxford History of Music, Encyclopedia of Bioethics* are examples of specialized encyclopedias. Like general encyclopedias, these are arranged in essays on topics of particular relevance to their field. The entries tend to be more complete than in the general encyclopedias and more detailed in their treatment of topics. The bibliography can be only as up to date as the date of the encyclopedia itself. Another useful aspect of these encyclopedias is the fact that they are indexed and have cross-references at the end of each entry. But as with the general encyclopedia, these volumes provide an overview of a topic rather than extensive bibliographies. If you are lucky, you may find that the entry you consult has an annotated bibliography in which the author of the piece makes a judgment about each reference and what it might be used for.

Other reference works. Almanacs, atlases and biographical dictionaries such as *the World Almanac and Book of Facts, The Times Atlas of the World, Dictionary of American Biography,* and *Who's Who* are used to check facts.

Bibliographies, indexes, and abstracts

In this category are all those materials that deal primarily with bibliographical information. There are general indexes and ones devoted to special fields, such as *Social Sciences Index, Humanities Index, New York Times Index, Reader's Guide to Periodical Literature, Book Review Index, Statistical Index, Books in Print, Dissertation Abstracts, The Philosopher's Index, Biological Abstracts, MLA Bibliography.* This category of materials is somewhat confusing because it contains several different terms. "Bibliography" means merely a list of books and other sources. An index "points to" where books or articles are to be found.

Some bibliographies, referred to as annotated bibliographies, provide a brief description or evaluation of the citation. These comments ("a reliable historical study"; "a new interpretation") are to be treasured as guides. These abstracting journals are usually published monthly and bound in annual volumes with a subject index and author index. Articles referred to are grouped by topic, and the entry includes complete bibliographic material and a summary of the article. Books are also entered in the abstracts. Since the abstracts survey hundreds and hundreds of journals, some or many of the articles abstracted will be unavailable, depending upon the size of your library. After reading the abstract, you must decide whether the article is important enough to your paper for you to read the article itself. Some indexes provide complete abstracts or summaries of the article or book cited.

In order to use indexes you must know the category under which to look, the key word. Thus, obviously, in a search for an essay on Dickens's *Hard Times,* the two key words are "Dickens" and "*Hard Times.*" But a topic will not always have an obvious key word. If so, you must be creative. The information you derive from the encyclopedia or other general reference works should give you several leads, or the books you have on the topic may give you ideas for entry words.

Citation index

One strategy is the forward search using the *Science Citation Index* or *Social Science Citation Index* or *Humanities Citation Index.* Unlike a search using *Biology Abstracts* or any other abstract series, where you search back through the literature for articles on your topic, the citation indexes are arranged so that you can search forward in the literature from a given reference to all the more recent articles that cite the given reference in their bibliographies. This indexing system is based on the assumption that research reports announcing new discoveries will cite previous research reports on the same topic. Let us say that you are working on a psychology paper on short-term memory. Your psychology textbook says that George Miller's article "The Magical Number Seven, Plus or Minus Two" is an important article. After reading this article, you can look up the author and article in a citation index. There you will find a list of all the articles published in a designated one-year period that have cited "The Magical Number Seven, Plus or Minus Two." You can in this way find

more recent articles about short-term memory. Since Miller's article was first published in 1956, you would consult only those volumes published after 1956, giving particular attention to the more recent annual indexes. A citation index is an effective way to locate up-to-date information.

Books The organization of books in library stacks is based on one of two systems: the Dewey Decimal System or the Library of Congress System. The number systems they use—that is, the codes by which they classify books—are different. The older Dewey system classifies books according to subject category (a number) and author (a letter). The system has proved inflexible for many new subject areas, so most libraries have switched to the Library of Congress System, illustrated in the example cards in figure 4.2, which assigns to each subject area a letter or combination of letters (European history D and DR) followed by numbers that designate subdivisions within the categories. College librarians will be happy to provide you with a breakdown of the classification system used in your library.

When looking in a card catalog for books, it is wise to look under as many different topics or references as possible. Remember our advice and keep a list of key words, that is, words that relate to your topic and might themselves be classified separately in bibliographies or the card catalog. Such a list not only allows you to approach your topic from different directions, it may also lead you to books in sections of the stacks you might not find if you restrict your search. You may discover other related books. For example, for a topic on King Charles II of England, key words you may come across are: England; Stuart, Monarchy (found in political science section), Cabal, London, Louis XIV (found in the history of France section). Browsing in these other sections may produce still more books containing pertinent information. Although browsing in itself is not an adequate research strategy, it can help you to uncover information that has eluded your organized search. Besides, browsing is fun.

Periodicals Periodicals include journals, newspapers, and magazines. Depending on your topic, you may find some or all of these periodically issued publications useful, for they contain short, theme-oriented pieces. Particularly in the specialized journals in your field of research, the articles often present types of writing you may not get from books. For example, journals contain articles outlining a new direction in a field, containing the latest research on a subject, or discussing debates that exist on your topic.

Journals are classified by their title in a special card catalog, not usually the same card catalog described above. Early in your research you should check your own library's holdings of those journals that seem to be frequent sources of articles on your subject. Then you can look at recent issues of the journal to find up-to-date material. The best way to search for articles when you don't know which journals to look in is to use the indexes described above.

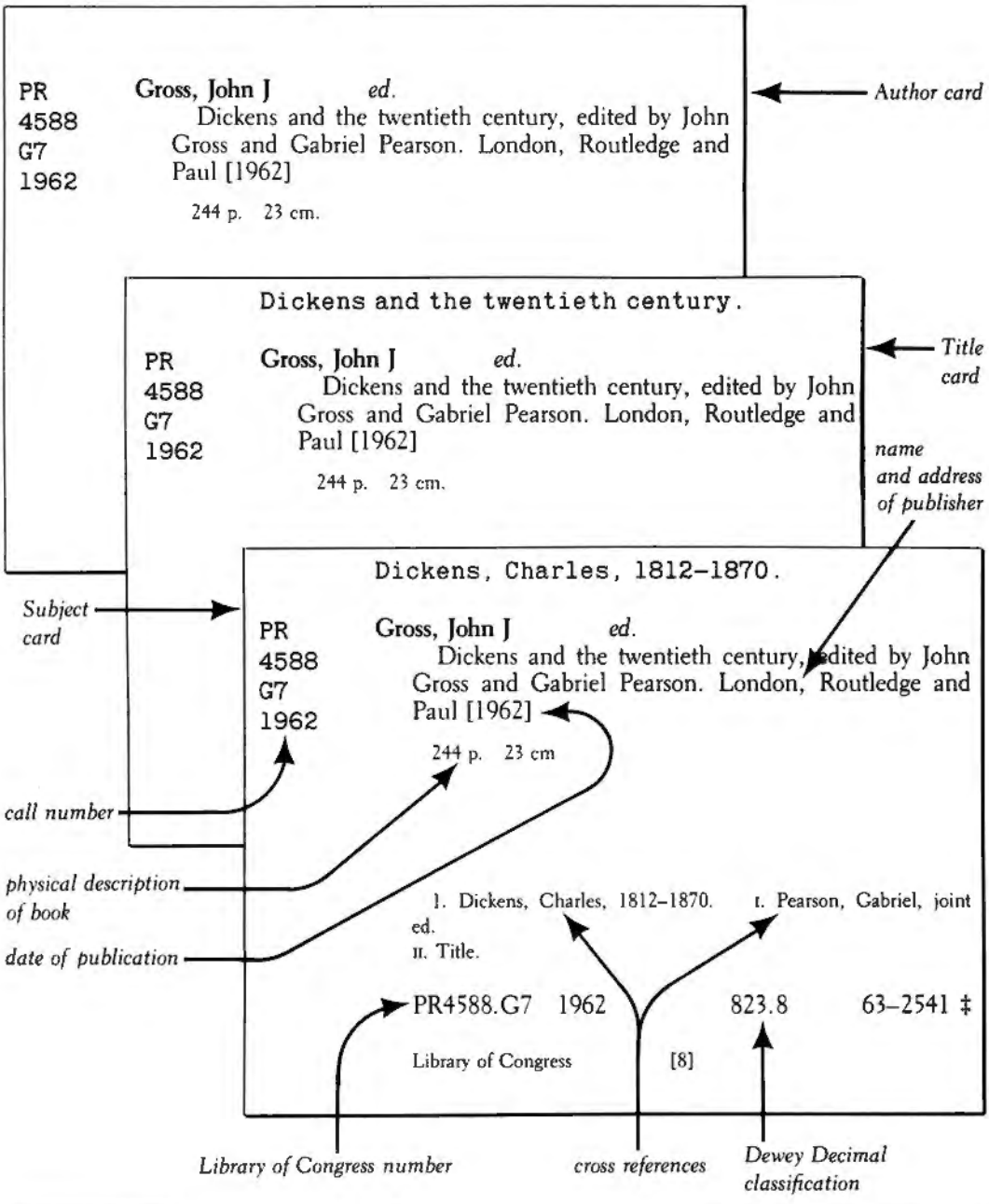


FIGURE 4.2
How to read cards in the card catalog.

Periodicals are available in three forms: current issues, which are located in the current periodical section of the library; bound past volumes; and some form of microfilm, such as microfiche or microcards. Periodicals should be used with caution. *Newsweek*, for example, is not sufficiently scholarly for many research projects, while it is usually futile to struggle through journals intended for advanced professionals. Your instructor may provide a list of journals that are most useful for your level of research and for your topic.

Not the least value of consulting periodicals is that they give you models for the tone and style of the discipline in which you are working, for organization, and for footnoting style (chapter 5). Articles are, in a sense, professional term papers.

Other library resources

In small colleges, if the library does not have a copy of a book you need, you can order it through interlibrary loan. Most libraries have this service. You can also order copies of articles that your library does not have. (You must pay for a photocopy of the article, so it is especially important that you be able to assess the probable value of something before you order it.)

You might also want to consider using a computer search of a topic. The computer provides a list of materials on the topic requested. When using a computer, you must carefully select a key word for the categories you want searched, for you want a list of a reasonable size. You limit what the output is by the key words you choose, by the dates you want searched, and by the characteristics of the materials you want. A computer search is of greatest value when the paper demands information as current or as comprehensive as possible.

Up to this point we have been discussing the library as it can be used by students in all disciplines. The following three sections of this chapter deal with the specialized resources that exist for three major areas of study: humanities, social sciences, and natural sciences. In each case we will take you through a hypothetical search to provide a model of how searches can be done. You should not think that library research is always conducted in a neat, sequential order as presented (general background, bibliographical search, specialized research). Actual library research is messy. We hope that the following procedure will help make it less messy and more productive.

Resources in the humanities

Assume you are assigned to do a research paper on Charles Dickens's *Hard Times*. The twofold task of researching this topic in the library requires that you find out useful information about *Hard Times* and find out where that information exists. As we have suggested in the first section of this chapter, your research begins at the most general level and progresses to the more specific sources.

Encyclopedias and specialized encyclopedias

If you begin with the *Encyclopaedia Britannica*, you will find that the article on Charles Dickens is seven pages long, followed by two columns of bibliography. In addition to getting an overview and chronology of his life, you will also read some conflicting opinions about him and a statement of the controversies that surround him and his work. In the bibliography, you will find listed several different types of literature used in compiling the encyclopedia entry: biographies, criticism, and anthologies. In addition, the list contains citations for other bibliographies from which to continue and expand your search.

Books

If you look in the card catalog under the subject category *Dickens*, you will find not only the editions of *Hard Times* possessed by the library but also books on *Hard Times*. An example is a book called *Twentieth Century Interpretations of Hard Times*, edited by Paul Gray. In a search for material on *Hard Times*, the discovery of a book like this is of enormous value. It is exactly on your subject with a set of essays by different people, so you ought to be able to get a wide perspective on the novel from it. Books like this also typically are very helpful for bibliographies. This collection of essays will help you with both of your purposes: to find useful content and to seek out appropriate additional sources.

Bibliographies in books like this also are typically selective and often usefully annotated. If you find this book, you will discover at the end of it two pages entitled "Selected Bibliography," which give you further references to material on *Hard Times*, with comments indicating why the editor is recommending them:

> Carnall, Geoffrey, "Dickens, Mrs. Gaskell, and the Preston Strike," *Victorian Studies*, VIII (1964), 31–48. A specialized but informative study of the influence of contemporary events on the composition of *Hard Times*.[1]

Book reviews

Book reviews are useful for several reasons. They provide a quick way of determining what is in a book. They give you information on how the book has been received, especially by other people in the field. The reviews in the more scholarly periodicals provide a critical commentary on the book, sometimes challenging the author on important matters. Thus, on one level, reviews are valuable in being convenient and quick, telling you right away whether the book is worth getting. This information is especially useful when the book is not immediately available. But at another level, book reviews in scholarly journals may have the same status and authority as a periodical article; it is perfectly acceptable to quote from book reviews as you do from periodical articles.

1 Paul Gray, ed., *Twentieth Century Interpretations of Hard Times* (Englewood Cliffs, N.J.: Prentice-Hall, 1969), p. 122. © 1969. Reprinted by permission of Prentice-Hall, Inc.

If you want a quick look at the contents of the book, the best source is *Book Review Digest*, which arranges its entries by author, title, and subject, alphabetically. It is called a digest because it prints excerpts from some of the reviews, which give you a sense of the book quickly. Other book review indexes include *An Index to Book Reviews in the Humanities*.

According to the *Encyclopaedia Britannica*, Edgar Johnson's *Charles Dickens: His Tragedy and Triumph* is "now the standard biography." Suppose you want to check on that judgment. Then look up Edgar Johnson in the relevant year of the *Book Review Digest* (for 1953, its first year of publication). You will find data on the book, a brief description of the content of the book, and whether it contains a bibliography or index. Then follow references to reviews in some twenty-one periodicals.

When there is a good article on your subject printed in a book whose title does not indicate it, look in the *Essay and General Literature Index*. If you look up Dickens in the 1975 edition, you will find that it indexes some articles on Dickens generally and also articles specifically on *Hard Times*:

Dickens, Charles

About

Frye, N. Dickens and the comedy of humors. *In* Wimsatt, W. K. ed. Literary criticism: idea and act p537–59

Quirk, R. Charles Dickens, linguist. *In* Quirk, R. The linguist and the English language p1–36

About individual works

Hard times

Haberman, M. The courtship of the void: the world of Hard times. *In* The Worlds of Victorian fiction p37–55[2]

This entry tells you there is an essay dealing with *Hard Times*, entitled "The Courtship of the Void; The World of Hard Times," printed in a book called *The Worlds of Victorian Fiction*, the essay appearing on pages 37 to 55.

Articles in periodicals

To find what articles on a subject have been published or to find more information on an article whose reference you already have, you consult a periodical index, such as *Reader's Guide to Periodical Literature, Social Sciences and Humanities Index, Humanities Index, International Index,* or *British Humanities Index*.

More specialized indexes, useful on other topics in the humanities, include *The Art Index, The Philosopher's Index, Music Index, Index to Reproductions of American Painting, Index to Reproductions of European Painting, Historical Abstracts.*

2 *Essay and General Literature Index*. Copyright © 1975 by The H. W. Wilson Company. Material reproduced by permission of the publisher.

A specialized bibliography in English is the *MLA Bibliography*. It is not selective, so it includes references to everything published in a given year on, say, Dickens. In the 1977 edition, for example, there are 113 items on Dickens, only six of them mentioning *Hard Times* in the title. This is not to say that only six articles discuss *Hard Times*; as we already saw, articles and books can be significant for a subject without that fact being reflected in the title. Thus, the following entry might well deal with *Hard Times*, but from the title one cannot tell:

> 5040. Feltes, N. N. "To Saunter, To Hurry: Dickens, Time and Industrial Capitalism." *VS* 20:245–67.[3]

To find out whether the article does deal with *Hard Times*, you must either read it or find an abstract of it. (See next section.) Specialized bibliographies are therefore not a good *initial* bibliographical source. It is reasonable however, to consult the most recent editions to find material too recent for other bibliographies. It would not be a reasonable enterprise, however, for an undergraduate term paper on *Hard Times* to take, say, the last ten editions of the *MLA Bibliography* and note down all the pieces that have *Hard Times* in their title (or related words or phrases that you should recognize from reading the novel, such as the Gradgrind School or Fact or Fancy.) You should notice which journals seem to be the ones significant articles appear in: *Nineteenth Century Fiction, Dickensian, Victorian Studies*. You can also look in *The New Cambridge Bibliography of English Literature* (CBEL) and in *Year's Work in English Studies*.

Abstracts of articles

Abstracts of articles summarize the content of the article and should be used to decide whether to read it or not, not as a substitute for reading it. From 1970 to 1975, the *MLA Bibliography* published a volume of abstracts of selected articles. You can also consult *Abstracts of English Studies*, which, since 1958, has published summaries of articles.

Library research in the social sciences

Social science materials can be searched by level of generality, as described in the first half of this chapter. We will describe materials at three levels of generality: encyclopedias and handbooks, books, and journal articles and indexes. A search conducted on any single topic will introduce only a subset of reference works in the social sciences. In these pages we select one topic—autism, a psychotic disorder characterized by emotional aloofness and delayed or absent speech—and we follow that topic through all reasonable reference materials. Although our search for information on

3 Reprinted by permission of the Modern Language Association of America from the *MLA Bibliography 1977*. Copyright © 1978 by the Modern Language Association of America.

autism will introduce a wide range of reference materials, at times we will point to related reference works that cover additional areas in the social sciences.

Encyclopedias, dictionaries, handbooks, and yearbooks in the social sciences

These references provide the most general level of information. They contain summaries of topics in the social sciences and are a good starting place for your research. The *International Encyclopedia of the Social Sciences* is written to help students and social scientists keep abreast of developments outside their specialties. The entries provide an historical perspective and sometimes also give some indication if controversies exist. The editors include some research contributions from outside the United States. But it is unlikely that the material found here would be of any more use, and might possibly be of less use, than that found in a good textbook.

In the section on childhood mental disorders in the *International Encyclopedia of the Social Sciences*, you find a paragraph on autism embedded in an eight-page article on childhood mental disorders. (See figure 4.3.) From this paragraph you obtain a reference to a book by Kessler, published in 1966. Since Kessler's definition is cited in this very general reference work, you can assume that her book as a whole is important to your search.

Reviews of the field

There are three series in the social sciences, *The Annual Review of Anthropology*, *The Annual Review of Psychology*, and *The Annual Review of Sociology*, and similar series in biology, chemistry, and medicine. Each annual volume contains about a dozen articles written as a review and perspective on the topic for professionals in the field. These reviews are highly regarded by social scientists, although students will find them a little more difficult to use than the *International Encyclopedia*. If the topic of your paper happens to be one in an area covered by a review article, an annual review will be an immensely useful addition to your bibliography. Below are examples of selected chapter titles from three recent annual reviews.

Annual Review of Anthropology
- Anthropological Economics: The Question of Distribution
- Apes and Language
- Dance in Anthropological Perspective

Annual Review of Psychology
- Prevention: The Clinical Psychologist
- Facial Expression of Emotion
- Individual Differences in Cognitive Abilities

Annual Review of Sociology
- The Sick Role: Assessment and Overview
- The Social Organization of the Classroom
- Urban Density and Pathology

FIGURE 4.3
Excerpts from Britton K. Ruebush, "Childhood Mental Disorders," in International Encyclopedia of the Social Sciences, *ed. David L. Sills, Macmillan/Free Press. Copyright © 1968.*

Mental Disorders

V
CHILDHOOD MENTAL DISORDERS

Early conceptions of mental disorders in children are reflected in several clinical papers on child-rearing practices from the sixteenth, seventeenth, and eighteenth centuries (see Kessen)

. . .

Autism and symbiotic psychosis. Childhood psychoses do not tend to crystallize into as many varieties or subtypes as is the case with adult psychoses (Kessler 1966). Two major subtypes have been defined in early childhood: infantile autism and symbiotic or interactional psychotic disorder. Age of onset in infantile autism is the first few months of life as the infant fails to develop a normal emotional attachment to a mother figure. He remains emotionally aloof, speech development is delayed or absent, feeding and sleeping problems and stereotyped motor and motility patterns are prominent, and the

look this up

symptoms

Each volume (except the sociology series) contains a subject and author index, with page numbers for each entry. The following entries on autism were found in the subject index of a recent volume of the *Annual Review of Psychology*.

hallucinations to self-destruction and simultaneously the enhancement of positive, socially appropriate behaviors.

Two developments of particular note described in the above reviews are the

. . .

not much on autism in this article

Behavioral interventions with autistic children typically must overcome particularly severe deficits of perception and responsivity to environmental contingencies and deficits in appropriate expressiveness, notably language. Reported interventions have often taken the form of case studies of experimental analyses of behavior in individual patients. See Lovaas & Newsom (171) for a comprehensive review.

Behavioral interventions with chronic psychiatric patients involve problems both in the initial training of behavior and in ensuring generalization and maintenance of behavior. The reinforcement history of these patients has been shown to render

this looks very useful →

171. Lovaas, O. I., Newsom, C. D. 1976. Behavior modification with psychotic children. In *Handbook of Behavior Modification and Behavior Therapy*, ed. H. Leitenberg, pp. 303–60. Englewood Cliffs, NJ: Prentice-Hall. 671 pp.

Human Studies

During the years 1973 through 1976, there were many significant advances in human behavioral genetics. Our telescopic overview of this research can be supple-

. . .

The amount of research in psychopathology has been especially impressive during this period, as indicated by the appearance of three books focused on the genetics of psychopathology (91, 206, 286) and by the large number of reviews of specific areas: schizophrenia (83, 108, 109, 275, 306, 333), affective disorders (104, 234, 304), neuroses (211, 241, 246), autism (113, 291), homosexuality (245), hyperactivity (34), criminality (40), and chromosome anomalies (213). The methodologically sophisticated XYY study recently reported by Witkin et al (330) substantiates the possible

113 Hanson, D. R., Gottesman, I. I. 1976. The genetics, if any, of infantile autism and childhood schizophrenia. *J. Autism Child. Schizophr.* 6:209–33

291. Stabenau, J. R. 1975. Some genetic and family studies in autism and childhood schizophrenia. In *Mental Health in Children*, ed. D. V. S. Sankar, 1:31–60. Westbury, NY: PJD Publications

The pages referred to, which were in two separate articles, are presented in figure 4.4. The numbers indicate references at the end of the chapter.

Education yearbooks

Handbooks are published every few years and provide excellent summaries and perspectives on diverse topics in education. For example, the *Second Handbook of Research on Teaching*, edited by R. M. Travers, contains forty-two chapters, each written by experts in the field, who summarize the cumulated state of knowledge and the impact of research in education. Topics include methodological issues; early education; mentally handicapped; gifted; reading, math and other content areas; teacher education. *The Teacher's Handbook*, edited by Dwight Allen and Eli Seifman, covers topics concerned with various aspects of the teacher's role; the instructional process; the development of the learner, both normal and exceptional; curriculum and content areas; and theoretical, sociological, and ethical issues confronting education. In these education yearbooks you will find references to the teaching of autistic children.

Political science and economics yearbooks

In your search for information on autism, you would not be likely to use materials in political science, economics, or business, but you should know that these fields also produce many handbooks and yearbooks. *The Annual Register of World Events: A Review of the Year* discusses world events by geographic region and includes documents and maps as well as chronology; *Demographic Yearbook* provides statistics for 250 countries; *Yearbook of the United Nations* presents the activities of the United Nations and its agencies. The Government Printing Office publishes thousands of documents annually, which are listed in the *Monthly Catalog of United States Government Publications*. A selective and more useful list is provided in *Public Affairs Information Service Bulletin*.

Students of political science and economics and business will need to use newspapers to obtain up-to-date information on their topics. The *New York Times* and the *Wall Street Journal* both publish indexes that guide the student to the location of articles on a topic. The *New York Times Index* provides a summary of news events with references to individual articles.

Books

After reviewing yearbook and encyclopedia material on your topic, you should turn to books and monographs. The card catalog entry for autism might yield the entries shown in figure 4.5.

When browsing through the stacks you frequently will find other useful books. In this case, a student looking for the Davids's book in the RJ section discovered that another book, *Annual Progress in Child Psychiatry and Child Development* by Stella Chess and Alexander Thomas, had two chapters on autism.

Following up on the reference to the book by Kessler cited in the encyclopedia article, we find in the foreword to the Kessler text that it is "addressed to people seriously interested in the general areas of child

FIGURE 4.4 (on facing page) *Entries in* Annual Review of Psychology. *Reprinted by permission of the authors and Annual Review, Inc.*

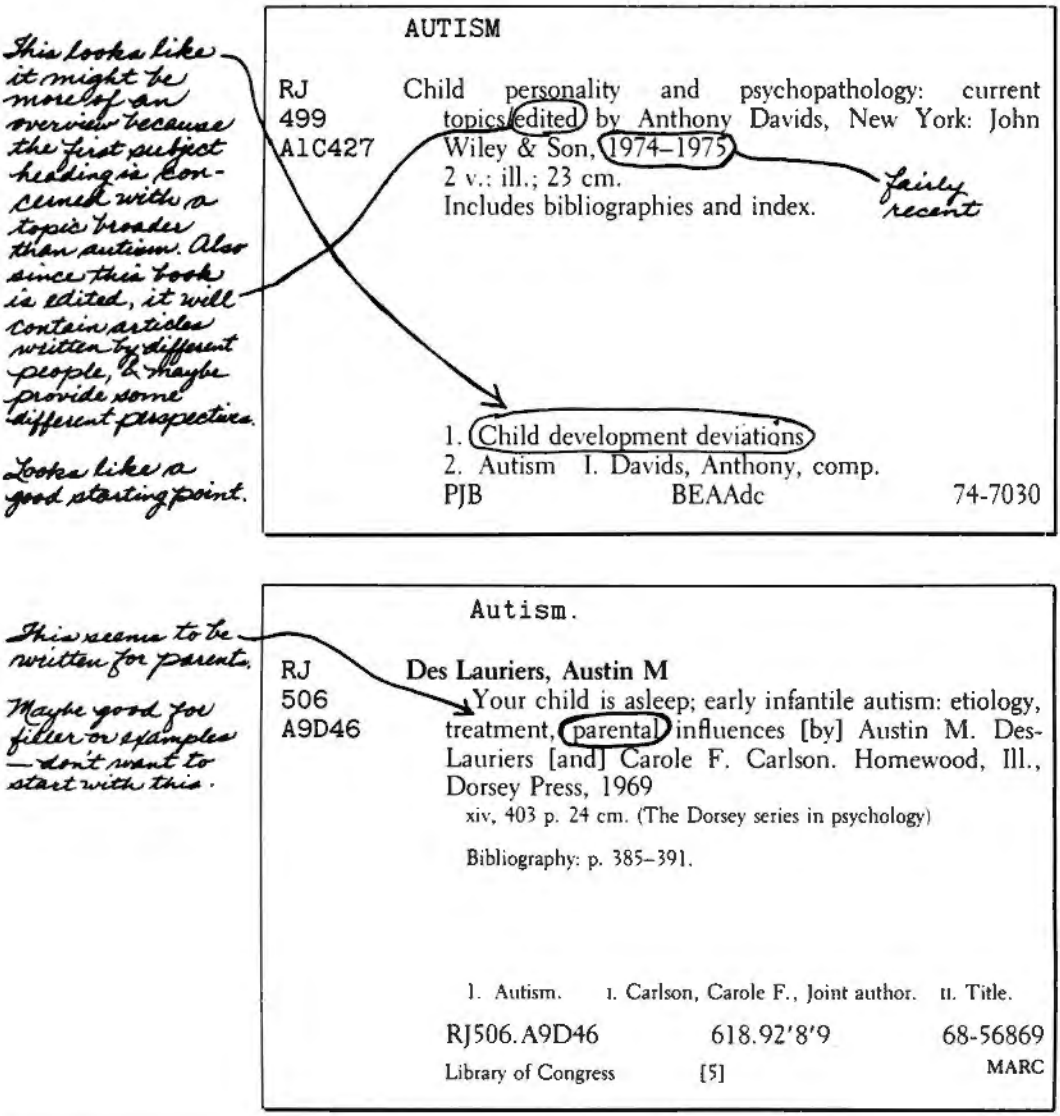


FIGURE 4.5
Card catalog entries.

These two books look like they were written by people with their own theories. I'll probably use them after I look at the David's reference.

Autism

RJ 506 A9B4

Bettelheim, Bruno.

The empty fortress; infantile autism and the birth of the self. New York, Free Press [1967]

xiv, 484 p. illus. 24 cm.

Bibliography: p. 461–468.

Autism

RJ 499 R54

Rimland, Bernard, 1928–

Infantile autism; the syndrome and its implications for a neural theory of behavior. [New York, Appleton-Century-Crofts [1964]

xi, 282 p. 22 cm. (The Century psychology series)

Bibliography: p. 237–265.

1. Autism. I. Title.

RJ499.R54 135.37 64–12897

Library of Congress [4–1]

These two books look interesting. If I decide to include treatments as a topic in my paper, I'll use them.

Autism

RJ 506 A9C6

Coffey, Hubert S.

Group treatment of autistic children [by] Hubert S. Coffey [and] Louise L. Wiener. Collaborators: Carter Umbarger [and others] Englewood Cliffs, N.J., Prentice-Hall [1967]

xii, 132 p. illus. 22 cm. (Prentice-Hall psychology series)

Bibliography: p. 131–132.

AUTISM – CASES, CLINICAL REPORTS, STATISTICS.

RJ 506 A9S79

Stuecher, Uwe.

Tommy: a treatment study of an autistic child. Arlington, Va., Council for Exceptional Children [1972]

xi, 52 p. illus. 21 cm.

Bibliography: p. 47–52.

1. Autism—Cases, clinical reports, statistics. I. Title.

RJ506.A9S79 618.9'28'98209 72–94299

MARC

I wonder what the Council for Exceptional Children is. It doesn't look like a regular publisher.

psychopathology." The book contains chapters on different types of pathology in children and includes a section on diagnosis of infantile autism.

Journal articles, bibliographic indexes

The most sophisticated level of research material is found in the journals, so it is unwise to read individual journal articles until you have looked at books, encyclopedias, or yearbooks first. Journal articles assume that the reader knows something about the subject already, and so they may use terms or discuss data without providing a context. If you have done background reading first, then journal articles provide up to date and very specific information that cannot usually be obtained elsewhere.

The way to find journal articles on your topic is to use the abstracts. Here is a list of major indexing or abstracting publications.

Psychological Abstracts
Child Development Abstracts and Bibliography
Sociological Abstracts
Resources in Education
Developmental Disability Abstracts
Women's Studies Abstracts
Abstracts in Anthropology
Crime and Delinquency Literature

In one year of *Psychological Abstracts*, the following entries were found under the key words *autism* and *early infantile autism* in the subject index. This search must be repeated in each years' subject index as far back as it is productive to search.

Authoritarianism 11798, 12099
Authoritarianism (Parental) [See Parental Permissiveness]
Authority 11099, 11531, 11798, 11806
Autism [See Early Infantile Autism]
Autistic Children 10747, 11816, 11841, 12069, 12088, 12178, 12217, 12273, 12702
Autohypnosis 10994
Automated Information Processing 12822

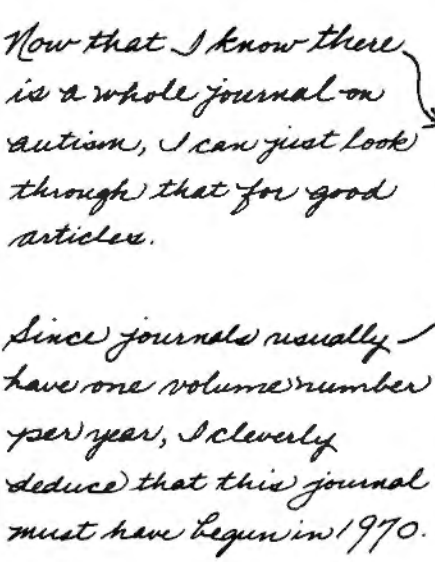
. . .

Early Infantile Autism 11815, 11816, 11840

Locating the numbers listed under the subject index yields the abstracts of articles. One abstract is shown in figure 4.6.

A search in one year of *Developmental Disabilities Abstracts* yielded several items in the subject index (figure 4.7). Notice that the summaries of these articles include the address of the author, a piece of information not available in *Psychological Abstracts*.

You can even find research reports that have not yet been published but that have been presented orally at professional meetings. A source of information for timely education-related reports is ERIC, standing for Educational Resources Information Center. The journal *Resources In*



11841. **Cantwell, Dennis P.; Baker, Lorian & Rutter, Michael.** (U California Medical School, Los Angeles) **Families of autistic and dysphasic children: II. Mothers' speech to the children.** *Journal of Autism & Childhood Schizophrenia*, 1977(Dec), Vol 7(4), 313–327. —Tested various hypotheses about deviance in the communication of mothers to their autistic children. The language of mothers of 13 autistic boys was compared to the language of mothers of 13 boys with developmental receptive dysphasia. The 2 groups of boys were of similar age (mean ages 9 yrs 0 mo and 9 yrs 7 mo, respectively), nonverbal intelligence (IQ at least 70), and language level. The language samples came from hour-long taped interactions between the mothers and their children in their homes. Aspects of maternal communication examined included the following: amount of language used, frequency usage of different types of utterances, syntactic complexity of utterances, grammaticality of utterances, clarity of communication, and tones of voice used. No differences were found between the 2 groups of mothers in level of language usage, pattern of functional interaction, or in overall clarity of communication. Findings provide *no* support for the suggestion that autism is due wholly or in part to deviant patterns of mother–child communication. (43 ref)—*Journal abstract.*

FIGURE 4.6
Entry in Psychological Abstracts. *Copyright © 1978 by the American Psychological Association. Reprinted by permission.*

Education (*RIE*) contains summaries and subject and author indexes for ERIC, as well as an institution index. Unlike the articles in other abstracting indexes, these articles are not published in journals, but are available from the ERIC Document Reproduction Service. Articles come in microfiche (film), which can be read on the library's microfiche reader, or in hard copy, which means on paper. Which form to order depends on its importance to your paper and your note-taking style. The microfiche is harder to read, but it is also much cheaper than the printed copy. Because most journals have a long time lag between first submission of an article by the author and its publication in the journal (two to two and a half years), ERIC is one way that authors disseminate their research more rapidly. You should therefore use the most recent issues of *RIE* in your effort to be up to date.

Resources in the natural sciences

Papers in the natural sciences are usually review papers and therefore must be up to date, comprehensive, and authoritative. Most references more than fifteen years old will be out of date and should be used only for historical purposes. Also, you should avoid nontechnical references (*Newsweek*, *Reader's Digest*, *The New York Times*), since these are generally popularized versions of the original, more complete research reports.

This seems very valuable — a complete search of the literature up to 1975. Although it would cost me $4.00, it would provide me with very complete information. I wonder if I can get it in time... the reference librarian probably knows how long it takes to get things from ERIC.

2426 *Autism. A Selective Bibliography. Exceptional Child Bibliography Series No. 603.* Reston, Virginia: Council for Exceptional Children, 1976. 32 p. Available from CEC Information Services and Publications, Council for Exceptional Children, 1920 Association Drive, Reston, Virginia 22091. Price $4.00.

Approximately 125 abstracts and associated indexing information are provided for documents or journal articles published from 1966 to 1975 and selected from the computer files of the Council for Exceptional Children's Information

. . .

for ordering microfiche or paper copies of the documents through the ERIC Document Reproduction Service.

None of these journals are the same as the ones cited in Psychological Abstracts — the two abstracting journals must search different types of journals. It's probably a good thing I looked in both.

2385 **KIERNAN, CHRIS.** Alternatives to speech: a review of research on manual and other forms of communication with the mentally handicapped and other noncommunicating populations. *British Journal of Mental Subnormality,* 23, Pt. 1(44):6-28, 1977.

The available evidence on alternatives to speech as means of communication suggests that nonco
munication and a
tistic state throug
manual systems.
How the whether
the speech acqui
tion is preferable
or alternative ma
ual cognitive dev
tion be answered
particular, the alt
native understan
ing supported

2449 **KELLY, JOHN B.; & SAMUELS, MARIAN.** A new look at childhood autism: school-parent collaboration. *Journal of School Health,* 47(9):538-540, 1977.

Special prolo
autistic child
schools can b
ents, and son
ents, school s
in honor. Spe
prolonged au
child schools

2342 **HAYES, R. W.; & GORDON, A. G.** Auditory abnormalities in autistic children. *Lancet,* 2(8041):767, 1977. (Letter)

Hearing tests administered by means of the electroacoustic impedence meter to 16 autistic children 8-15 years of age with no records of an

FIGURE 4.7
(on facing page)
Entries in Developmental Disabilities Abstracts. *(DDA ceased publication in 1978, after appearing for ten years.)*

The process of locating references on a topic in the natural sciences is divided into three levels. First, you identify appropriate search words to help you locate information on your topic. Second, you identify and use textbooks, encyclopedias, data books, dictionaries, and/or monographs to learn the background information appropriate to your topic. Third, you identify and use recent review articles and research reports to learn the current state of knowledge on your topic. Here we use the topic of the relationship between marihuana and the female hormone estrogen to exemplify the search process, and in chapter 14 we use the same topic to show the process of writing a review paper in the natural sciences.

Background research

Discovering the conceptual framework in your subject area and determining exactly where your topic fits into this framework requires a considerable effort with relatively little visible results. That is, much of what you learn about your topic will not be converted directly into paragraphs in a term paper, but your understanding of the context will be crucial to the quality of your paper. Acquiring background knowledge is especially difficult in the sciences because of the dense technical quality of scientific information. But thorough background research assures in-depth understanding and confidence, which in turn inevitably shows up in your written work. Since the purpose of a textbook is to provide an overview of a discipline, your best starting point is often a search through the relevant textbooks you already own.

One of the most persistent problems in scientific literature searches is the successful selection of key words or search words that will lead to information on a given topic. Unfortunately, scientists do not always remember to put seemingly obvious key words into the titles of their research reports and books. Consequently, you will have to create a list of potential search words. Without these search words, it would be virtually impossible to locate specific information on your topic in all the thousands of books and hundreds of thousands of research reports published annually.

In the sample search on the marihuana-estrogen problem, you must identify search words that will produce information on the possibility that the active ingredient in marihuana may interact with or imitate estrogen. Working from the obvious search word "marihuana" and its alternate spelling, "marijuana," you can expand your search words by referring to the background reading:

marihuana
marijuana
    (alternate spelling)
tetrahydrocannabinol
    (active ingredient)
THC, Δ^9-THC, Δ'-THC
    (abbreviations of tetrahydrocannabinol)

Cannabis
(Latin name of marihuana plant)

The importance of multiple search words should be obvious when you discover that many scientists refer to the active ingredient, tetrahydrocannabinol, rather than the name of the plant, marihuana.

You should also write down some more general terms that include your primary topic, just in case the specific topic is not listed. In this case, those terms could be "hallucinogen," "toxicology," and "pharmacology." Colloquial terms are generally not used in scientific writing, and therefore your search words need not include "pot" or "grass."

General encyclopedias

You might want to consult one or two of the general encyclopedias for background information on your topic. These sources, however, do not make very impressive references for your supposedly up-to-date paper, because a five-year or greater lag time occurs between the announcement of new discoveries and their inclusion in general encyclopedias. High-school students typically base their science papers on encyclopedia entries; college students begin to use monographs and technical journals as the major sources of information for their papers. Experienced college-level writers omit the general encyclopedias entirely from their search and instead concentrate their efforts on more up-to-date resources.

Specialized encyclopedias

Certain specialized encyclopedias also can be useful if they include your topic. An example of such an encyclopedia is a new thirteen-volume reference on animals, *Grzimek's Animal Life Encyclopedia*. This encyclopedia is an outstanding source of information on animals, especially the vertebrates and is also useful because it has substantial, although not always conveniently arranged, bibliographies.

Both scientific dictionaries and regular unabridged dictionaries might help you understand unfamiliar words not found in your textbook, although these definitions will almost never be recent enough to be quoted directly in your paper.

Data books and handbooks

Technical information on a variety of scientific subjects is frequently organized into data books. The best known reference of this type in the field of biology is the *Biology Data Book*. This three-volume work is part of a series, and the other books in the series (for example, *Respiration and Circulation* and *Metabolism*) can be helpful in searching for information on specific topics.

Other handbook references are useful in many science searches. The *Merck Index* provides chemical information that explains, for instance, why some articles call Δ^9-THC the active ingredient of marihuana while others mention Δ^1-THC instead. A second handbook reference is the *Handbook of Chemistry and Physics*, which has many tables of chemical compounds.

Books If you are lucky, you might find in the card catalog a very recent book or collection of articles on your topic. If these books were published further back than two or three years ago, they will only add to your collection of slightly out-of-date background information and are therefore best eliminated. For example, a search through a typical college library card catalog under the search word "marihuana" revealed many well-thumbed cards, but only one book that was recent enough and sufficiently technical to seem even vaguely promising, and even this reference was several years old, so it probably would not have much recent information. Remember, in the natural sciences, information in books is never as up to date as information in periodicals. Books take a long time to be published, and in the meantime the information they present becomes somewhat out of date.

Periodicals The scientific periodicals are your most important source of up-to-date information. These journals publish articles (research reports) that announce the discovery of new scientific information. Some of these journals, like *Science* and *Nature*, contain research reports from a wide range of scientific disciplines, while others have reports from only a single discipline, like *Anatomical Record* and *Journal of Plant Physiology*.

Most research reports are written entirely by the scientists who did the research. But some scientists, often working with professional editors, write articles about their research intended for a general audience. These articles are valuable and can be used easily by undergraduates. The best-known sources for such articles include the journal *Scientific American*, the more technical journals *American Scientist* and *Bioscience*, and the less technical journals like *National Geographic* and *Smithsonian*. These journals are adequate source materials for most freshman classes. More advanced students should consult actual research reports.

Most published research reports are intended for the enlightenment of other scientists working in the same field, and these articles assume that the reader is already familiar with a specialized vocabulary. If you are going to understand these articles, you will need the vocabulary learned during your background reading, and you will have to cultivate a slow, deliberate, and thorough reading style.

Your most critical problem when doing library research on a scientific topic is to locate the most significant and recent five or so research articles on your topic. This is no small task, since more than a million scientific research reports are published each year. Fortunately, a variety of indexing and abstracting services can help you retrieve appropriate articles limited to your topic. As a beginning, students feel compelled to consult *Reader's Guide to Periodical Literature*, but this index includes only two or three (*Science*, *Scientific American*) of the thousands of journals publishing scientific research articles.

A relatively new indexing service, *General Science Index*, began in 1978. It indexes articles from approximately ninety major journals in the

natural sciences and follows the *Reader's Guide* format. Although relatively shallow in its coverage, *General Science Index* is a reasonable starting point, especially for freshman or sophomore searches. For more in-depth searches, a specific and more complete index will produce the best results.

The numerous specific indexes differ both in their format and in the subject areas they include. The *Science Citation Index*, for example, includes articles from all the natural sciences. Most other indexes cover only one scientific discipline. For example, *Biological Abstracts* and its companion index, *Bioresearch Index*, as well as the *Biological and Agricultural Index* (a companion to *Reader's Guide*) and the *Biology Digest*, all index articles on topics in biology. Some indexes are even more limited; *Zoological Record* restricts its coverage to articles on the biology of animals.

Some of the more frequently used indexes for various scientific disciplines are:

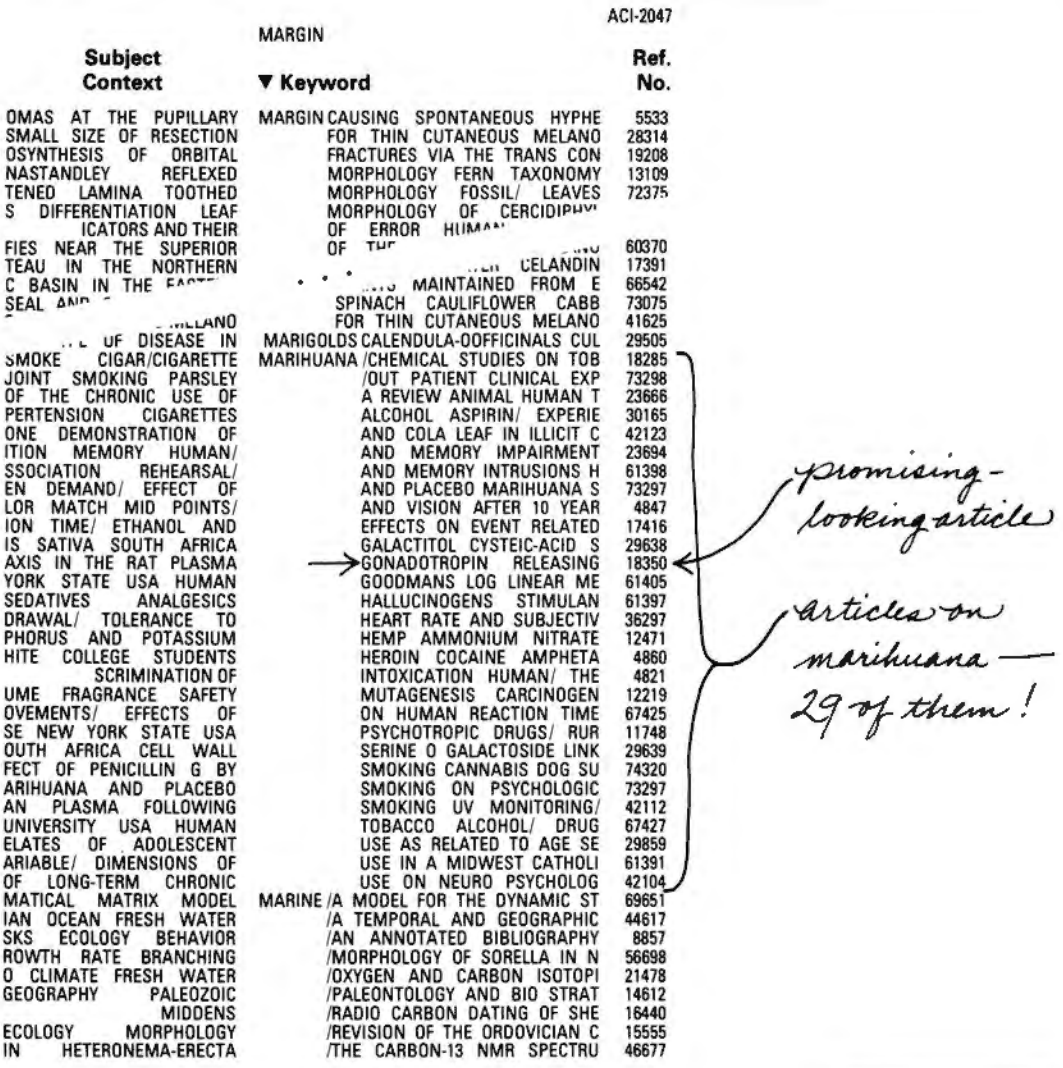
Astronomy and Astrophysical Abstracts
Biological Abstracts
Chemical Abstracts
Bibliography and Index of Geology
Index Medicus
Physics Abstracts

In the marihuana-estrogen search we would select *Biological Abstracts* as an appropriate index. *Biological Abstracts* indexes and abstracts the biology articles contained in approximately 8,000 different journals. The abstracts themselves, which are short summaries of individual research reports, are arranged by topic and then numbered consecutively. To help you find the particular abstracts that you need, there are five different indexes: author, biosystematic, generic, concept, and subject. Most students find the subject index easiest to use.

Locate a key word in the subject index. Stop to examine the format of the index (figure 4.8). The most important words from the title and from the article itself have been condensed to a single, somewhat confusing line of type. A slash indicates the beginning of the title. The reference number in the right-hand column gives the number of the abstract. For example, in this list, only the twelfth article appears to deal with the relationship between marihuana and the estrogen hormones:

AXIS IN THE RAT PLASMA GONADOTROPIN RELEASING 18350

Now look in the appropriate book of abstracts to find number 18350 (see figure 4.9) and read the abstract. Notice, by the way, that the actual title of the article has neither the term "marihuana" nor "gonadotropin." Repeat this process until you have about ten promising abstracts. Then locate these relevant original articles in the journals indicated. The article abstracted in figure 4.9 was originally published in volume 23 of *Neuroendocrinology*.



ACI-2047

MARGIN

Subject Context	▼ Keyword	Ref. No.
OMAS AT THE PUPILLARY	MARGIN CAUSING SPONTANEOUS HYPHE	5533
SMALL SIZE OF RESECTION	FOR THIN CUTANEOUS MELANO	28314
OSYNTHESIS OF ORBITAL	FRACTURES VIA THE TRANS CON	19208
NASTANDLEY REFLEXED	MORPHOLOGY FERN TAXONOMY	13109
TENED LAMINA TOOTHED	MORPHOLOGY FOSSIL/ LEAVES	72375
S DIFFERENTIATION LEAF	MORPHOLOGY OF CERCIDIPHY	
ICATORS AND THEIR	OF ERROR HUMAN	
FIES NEAR THE SUPERIOR	OF THE	60370
TEAU IN THE NORTHERN	CELANDIN	17391
C BASIN IN THE EAST	MAINTAINED FROM E	66542
SEAL AND	SPINACH CAULIFLOWER CABB	73075
MELANO	FOR THIN CUTANEOUS MELANO	41625
OF DISEASE IN	MARIGOLDS CALENDULA-OOFFICINALS CUL	29505
SMOKE CIGAR/CIGARETTE	MARIHUANA /CHEMICAL STUDIES ON TOB	18285
JOINT SMOKING PARSLEY	/OUT PATIENT CLINICAL EXP	73298
OF THE CHRONIC USE OF	A REVIEW ANIMAL HUMAN T	23666
PERTENSION CIGARETTES	ALCOHOL ASPIRIN/ EXPERIE	30165
ONE DEMONSTRATION OF	AND COLA LEAF IN ILLICIT C	42123
ITION MEMORY HUMAN/	AND MEMORY IMPAIRMENT	23694
SSOCIATION REHEARSAL/	AND MEMORY INTRUSIONS H	61398
EN DEMAND/ EFFECT OF	AND PLACEBO MARIHUANA S	73297
LOR MATCH MID POINTS/	AND VISION AFTER 10 YEAR	4847
ION TIME/ ETHANOL AND	EFFECTS ON EVENT RELATED	17416
IS SATIVA SOUTH AFRICA	GALACTITOL CYSTEIC-ACID S	29638
AXIS IN THE RAT PLASMA	GONADOTROPIN RELEASING	18350
YORK STATE USA HUMAN	GOODMANS LOG LINEAR ME	61405
SEDATIVES ANALGESICS	HALLUCINOGENS STIMULAN	61397
DRAWAL/ TOLERANCE TO	HEART RATE AND SUBJECTIV	36297
PHORUS AND POTASSIUM	HEMP AMMONIUM NITRATE	12471
HITE COLLEGE STUDENTS	HEROIN COCAINE AMPHETA	4860
SCRIMINATION OF	INTOXICATION HUMAN/ THE	4821
UME FRAGRANCE SAFETY	MUTAGENESIS CARCINOGEN	12219
OVEMENTS/ EFFECTS OF	ON HUMAN REACTION TIME	67425
SE NEW YORK STATE USA	PSYCHOTROPIC DRUGS/ RUR	11748
OUTH AFRICA CELL WALL	SERINE O GALACTOSIDE LINK	29639
FECT OF PENICILLIN G BY	SMOKING CANNABIS DOG SU	74320
ARIHUANA AND PLACEBO	SMOKING ON PSYCHOLOGIC	73297
AN PLASMA FOLLOWING	SMOKING UV MONITORING/	42112
UNIVERSITY USA HUMAN	TOBACCO ALCOHOL/ DRUG	67427
ELATES OF ADOLESCENT	USE AS RELATED TO AGE SE	29859
ARIABLE/ DIMENSIONS OF	USE IN A MIDWEST CATHOLI	61391
OF LONG-TERM CHRONIC	USE ON NEURO PSYCHOLOG	42104
MATICAL MATRIX MODEL	MARINE /A MODEL FOR THE DYNAMIC ST	69651
IAN OCEAN FRESH WATER	/A TEMPORAL AND GEOGRAPHIC	44617
SKS ECOLOGY BEHAVIOR	/AN ANNOTATED BIBLIOGRAPHY	8857
ROWTH RATE BRANCHING	/MORPHOLOGY OF SORELLA IN N	56698
O CLIMATE FRESH WATER	/OXYGEN AND CARBON ISOTOPI	21478
GEOGRAPHY PALEOZOIC	/PALEONTOLOGY AND BIO STRAT	14612
MIDDENS	/RADIO CARBON DATING OF SHE	16440
ECOLOGY MORPHOLOGY	/REVISION OF THE ORDOVICIAN C	15555
IN HETERONEMA-ERECTA	/THE CARBON-13 NMR SPECTRU	46677

FIGURE 4.8
Excerpt from the subject index of Biological Abstracts, *vol. 65, showing the listing of articles on the subject of "marihuana." Copied with permission of BioScience Information Service.*

Even with *Biological Abstracts*' subject index and those thousands of abstracted articles, you will still spend a considerable amount of time on your search and yet miss some good references. Because of this problem, the computer-assisted search is becoming increasingly popular and certainly offers several advantages if properly designed. First, you will save some time, although designing the search takes several hours. Second, you will get a more thorough search since the computer usually includes several different indexing services in its data base. But you should also weigh the drawbacks: the computer search does cost more, and if you

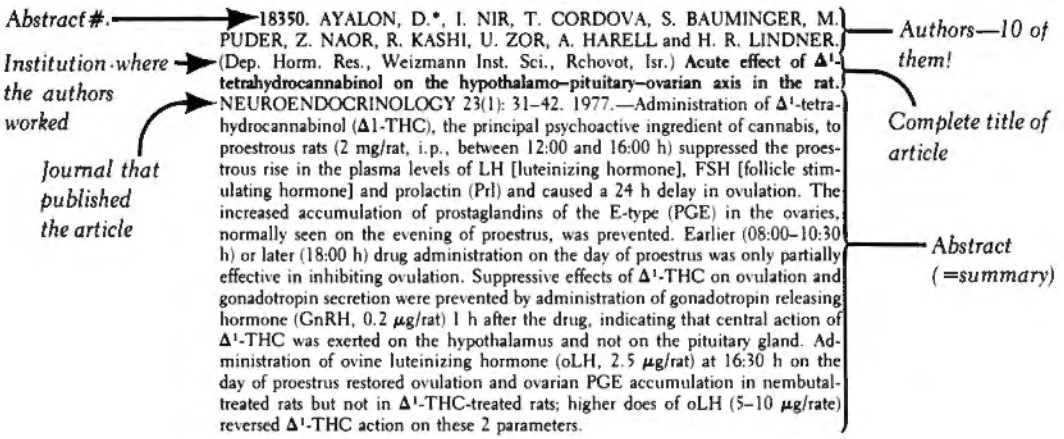


FIGURE 4.9
Excerpt from Biological Abstracts, *vol. 65, showing a single abstract of a research report. Major parts of the abstract are labeled. Copied with permission of BioScience Information Service.*

design the search poorly, you can waste a lot of money. Also, only some of the references will have abstracts, and some will clearly be irrelevant. The information you present on the form is crucial to a successful search. For example, a request asking for all articles on the physiological effects of marihuana published in the last five years and giving no sample references produced a list of thirty marihuana references, but none on the particular problem of estrogen mimicry. When we redesigned the request to be more specific, the results were more satisfying: thirty-seven articles, thirty-two of which were directly relevant to the specific paper topic.

Review articles

In addition to writing research reports, scientists also occasionally produce articles summarizing the state of knowledge in their particular field of research for the benefit of scientists outside that specialty. Most of these review articles appear in annual volumes with helpful titles like *Annual Review of Biochemistry* or *Recent Advances in Phytochemistry*, although some review articles can be found in regular scientific journals.

The most common method for discovering these articles is in the list of references of your up-to-date research reports. Otherwise, you will have to consult the *Bioresearch Index*, a companion indexing service to *Biological Abstracts*, which does index the articles in review series, or you would have to prepare a list of the likely looking review series (for example, in the sample search, *Annual Review of Pharmacology and Toxicology*, *Advances in Pharmacology and Chemotherapy*, *Advances in Drug Research*, and *Pharmacological Reviews*) and then check the table of contents for the last three volumes of each series for a useful review article.

These review papers can help you by organizing and summarizing the important research reports on your topic, but they also have three draw-

backs: they may be out of date, since they are based on already published research; they may be biased, emphasizing the author's own opinions and research; and they may discourage you from independently organizing and summarizing the original research reports.

In summary

No matter what your discipline, your use of the library will have several common features. For all searches, there is the twofold process of generating a bibliography on a topic at the same time that the topic is being defined and refined by the content you are accumulating. For all disciplines, as we have seen, the search proceeds best from the general to the more specific. In using the library for a research problem, you have to make numerous decisions.

Always try to determine the specific expectations of your readers, whom you should usually presume to be scholars in the field of your research. These scholars will hold you to standards that are appropriate for apprentices in their field, so you don't have to worry about becoming an expert. Ask your instructor about the primary expectation for the particular paper you are working on. Is it more important, for example, that the paper be comprehensive or argumentative? Your readers' differing expectations will guide your choices of resources for research. In table 4.1 we list, on the left, various expectations for research papers and, on the right, the major research resources for each expectation.

QUESTIONS

1 Describe how you might use series of abstracts to save time in your research.

2 In a paragraph describe how you would find book reviews of a book that you have consulted during your research.

3 What do you do if your college library does not have the book you need to complete research on your topic?

4 Why are periodicals usually more useful than books for research on scientific topics?

EXERCISES

1 Select a topic, preferably a topic on which you are going to write an assigned paper, and read about it in the *Encyclopaedia Britannica*. What leads do you find from a proper use of this research aid?

2 Think of the categories of reference materials that you might consult for a paper on animal rights. Study figure 4.1 and then label concentric circles for the references you would use.

3 Using your response to exercise 1 as a beginning, make a list of key words suggested by your topic. Look these words up in your library's card catalog. Did you discover possibly useful books under the different entries?

TABLE 4.1
Research resources for various expectations for research papers

Expectations	*Resources*
Up to date	Look for journals; use the most recent references. Find out if something important has happened to or on your topic which makes all previous work outdated. If so, this new development gives you a limit to the search. In books, look for recent symposia, particularly if they include bibliography.
Comprehensive	Look for a book that has your topic as its primary focus. This is the best place to begin, for it makes the boundaries of the topic clear. Bibliographical search is especially important here.
Authoritative	Look for material to certify the authority of your source. In a paper on the biology of DNA, it might be all right to quote *Newsweek* as an example of what the media are saying about the issue, but not as an authoritative source on an issue in biology. If you use a source heavily and authoritatively, you should find out how authoritative it is, in the case of books, by consulting book reviews (in an authoritative journal!) and in the case of periodicals by consulting specialized indexes if they are available (ask reference librarian) or by checking the biographies of the authors. Use the *Dictionary of American Scholars* (for scholars in the humanities) or *American Men and Women of Science* (for natural and social scientists). Or ask your instructor.
Representative	The key here is to look for material that is one level above the example you are working with. For example, if you are to write about a school of writers or a school of art, you should not take one case and write as if that was representative of the school unless you have good reason to believe that this case is exemplary. If you are writing about Manet as an Impressionist, then you must read a book on Impressionism.
Argumentative	Find controversy by looking in journals for articles with titles like "A Reply to . . ."; "In Defense of. . . ."

4 Select one of the three areas of study discussed in the sections entitled "Resources in . . ." and find out which of the resources discussed are in your college library.

5 Imagine that you have decided to write a paper on one of the following problems:

a The evolutionary relationship between gorillas and humans

b How the Viet Nam War affected the 1968 presidential campaign

c The reasons for the attractiveness of religious cults.

Conduct a limited library search for books and articles that would be most useful to you. Limit yourself to the five best references. Explain briefly how you found each one.