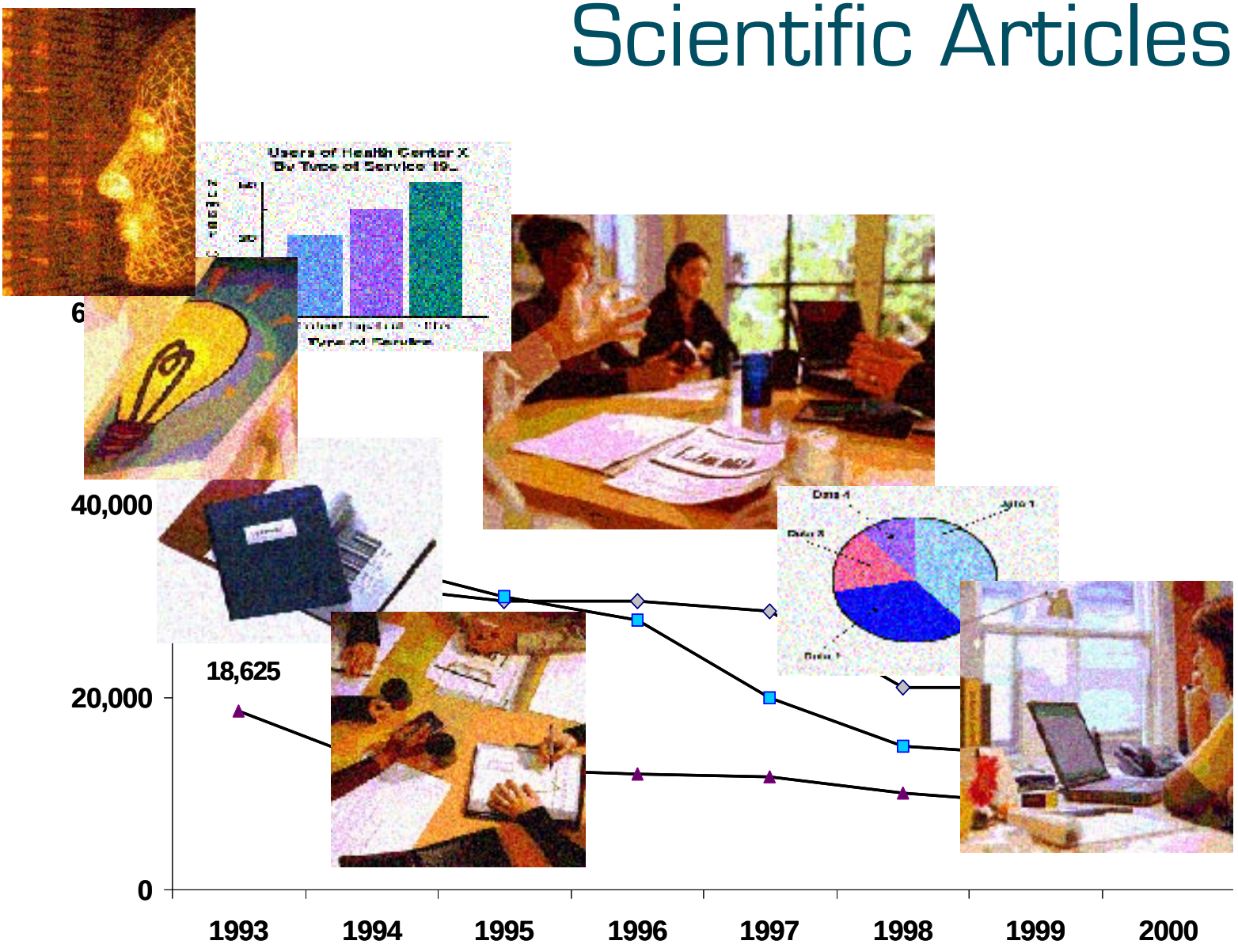
The Data and Internet Literacy Series

Training Module 1:

Making Sense of Scientific Articles



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SOCIOMETRICS

Making Sense of Scientific Articles

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Note: Because of the dynamic and fast-changing nature of the Internet, one or more of the web links given in this module may no longer be active at the time this module is used.

Introduction: Why Read the Scientific Literature?

The scientific literature represents all of the knowledge that researchers have amassed over the years, organized by scholarly discipline. Indeed, writing scientific papers is the main way in which scientists share ideas with one another. By familiarizing yourself with this literature, you will come to share a common knowledge base with others in your field, both across the country and around the world. Reading **journal articles** on a regular basis will help you to remain up-to-date on new developments and ongoing controversies in your area of expertise. At a more specific level, carrying out a focused **literature review** can help you achieve practical goals. Below are a few examples of situations where conducting a literature review would be of practical use.

Example 1: *You plan to conduct research in a certain domain.*

- Read the scientific literature to discover whether someone already has carried out research along the lines of what you plan to do. If so, then the information you intended to seek may already be widely known. Review relevant articles to find out whether or not your research question still needs to be answered.
- Read the scientific literature to determine the best methodological strategies for collecting data on your topic of interest. It may well be that many years of trial and error have led researchers to adopt certain tools and procedures, while rejecting others.
- Read the scientific literature to figure out how you can make a contribution to the field. Scientific knowledge advances through the accumulation of data. Your impact on the field will be greatest if you can identify a topic that has not yet been investigated and fill in the gap.

Example 2: *You plan to develop a program to address a need or concern in your community.*

- Read the scientific literature to discover whether someone already has developed a program along the lines of what you plan to do. If a good program already exists, then there is no need to "reinvent the wheel." Review relevant articles to find out whether or not the program you have in mind still needs to be developed from scratch.
- Read the scientific literature to learn about the elements that are likely to enhance your program's effectiveness. Incorporate the successful aspects of previous programs, while avoiding those that others have found relatively ineffective.
- Read the scientific literature to learn about important characteristics of the population you intend to target. If, for instance, you plan to implement a program aimed at reducing teen smoking, then it will be useful to know the ethnic, socioeconomic, and geographic background of heavy teen smokers.

- Read the scientific literature to figure out how you can best contribute to the field of intervention work. By extending or improving upon programs that have been developed by others, you help the field to move forward.

Example 3: *You plan to make a case that the work you are doing deserves financial support, or that the policy you are promoting deserves political support.*

- Read the scientific literature to locate statistics and quotes that support your line of reasoning. Citing scholarly sources lends greater authority to the arguments you make.
- Review the relevant literature to show that there is a clear need for the work you are doing. If you can demonstrate that your project or policy fills a gap, it is more likely to be viewed by others as valuable.
- Cite scholarly sources to show that the approach you are taking has been successful in the past. If you can demonstrate that you are using methods that are tried-and-true, others will have more confidence in your work.
- Cite scholarly sources to show that that you are extending or improving on the work of others. Doing so demonstrates that you are contributing to the advancement of the field.

Clearly, there are many good reasons to conduct a focused review of the scientific literature. *But how to begin?*

This module will help you break into the scientific literature to extract the information you need from journal articles. As you progress through this module, you will notice a few special features designed to facilitate your learning and comprehension.

Words in **bold** type	Words in **bold** type appear throughout the module. These highlighted terms are further defined and illustrated in your Module Glossary.
	The Activity Sets contain several activities for you to practice what you've learned. The activities can be completed at the point in the module where they are suggested, or you may choose to complete them once you have read through the entire module and feel that you are ready to try out what you have learned. Feel free to choose the learning style that works best for you.

How to Do a Literature Review

The number of articles that have appeared in the scientific journals of any given discipline is enormous. For almost any question or theme that one might choose, reading through every single article that has been published on the topic is likely to demand a super-human effort. Not even the most eminent scholars in the social sciences read *every* potentially useful publication that comes out in their field over the course of a single year, even though they already possess a solid grounding in the literature of their discipline. For individuals who lack such grounding, plunging into the wide oceans of scientific knowledge may well seem quite daunting. Reviewing the scientific literature, however, does not require diving off of a high cliff into the depths! More likely than not, you have come to the idea of conducting a literature review with some practical application in mind.

The overarching goal of your review is not to learn *everything* there is to know about a general domain, but to become familiar with the concepts and findings *most useful* to the task at hand.

Aim to be as efficient as possible in your search for these materials, avoiding the distractions of less relevant information.

Your primary focus in reading scientific literature is to familiarize yourself with the concepts, lines of argument, and research findings that guide well-informed discussions around the specific issue that interests you. A good literature review will provide you with answers to questions like:

- What do today's researchers agree already has been demonstrated?
- What do they agree has not yet been shown?
- Are there currently competing explanations for a given phenomenon?

If you happen to be conducting a literature review as a prelude to carrying out your own research, then a second focus will be to learn about the data collection methodologies and data analysis techniques that are widely-used and respected by scholars who share your research interests. In this case, a review can help you decide on a practical approach to take in your own work, answering questions like:

- Are questionnaires treated as an appropriate way to collect information about related issues, or is direct observation preferred?
- Do researchers tend to focus on differences between distinct groups or on individual variation within a single group?
- What specific statistical analysis techniques come up again and again across different studies?

There are several different kinds of scientific publications that you can consult in order to find answers to questions like those above. The type of literature on which you spend the most time and energy should reflect the underlying goals of your review.

Types of Scientific Publications

- Scholarly Empirical Papers. *Focus most of your attention on scholarly* ***empirical papers*** *if your main interest is in collecting information about concrete scientific findings, including (but not limited to) technicalities of data collection and analysis.* Since **scholarly journals** are characterized by features designed to ensure high quality, such as the acknowledgement of references and review by other experts in the field, the empirical papers that they contain provide the most solid evidence for data-based arguments.
- Book Chapters. Scientific findings reported in **book chapters** are likely to be of high quality as well, provided that the authors also have published a substantial number of journal articles. (If in doubt, check.) Because books are not subject to the same standards of peer review, however, scientific findings that appear solely in a chapter may be considered less empirically sound. Yet at the same time, book chapters provide a much richer overview of theoretical issues than empirical papers in journals do. *Focus your attention on book chapters if you want to balance hard data with theoretical views.* If you find a book chapter that is useful, be sure to flip through the rest of the book. You are likely to find some of the other chapters interesting as well.
- Review Papers. One variety of journal article that does emphasize theory over the particulars of data collection is the **review paper**. Whereas empirical papers argue a certain point by detailing the nuts and bolts of a study (or a few studies) that support(s) it, review papers support their arguments by synthesizing the findings of many different studies into a single coherent view on an issue. Review papers tend to be longer than empirical papers, but reading through them is a good way to come up to speed quickly on the general state of knowledge in a particular domain. *Focus your attention on review papers if you need to collect a lot of background information in a short amount of time.* Professionals often find review papers to be the most useful type of publication, given their needs. However, review papers are less useful when the main purpose of a literature search is to gain familiarity with the practicalities of data collection and analysis. Review papers typically are found in scholarly journals whose titles include words like "Review" or "Bulletin."
- Government Publications. Various other kinds of literature can be included in your review as well. *If the issue at hand relates to public policy, for instance, you may find it worthwhile to locate certain* ***government publications***. The Government Printing Office (GPO) is legally responsible for printing such publications. The GPO Access Catalog of U.S. Government Publications can be found on-line at:

  www.access.gpo.gov/su_docs/locators/cgp/index.html.
- Think-Tank Publications. *Another resource for literature reviews that deal specifically with public policy issues is* ***think-tank publications***. Think-tanks are institutions that specialize in producing research aimed at influencing government policy. Many of the larger think-tanks make the full text of their policy papers available to the public on their websites. Bear in mind, however, that

Types of Scientific Publications

- **Scholarly Empirical Papers**. Most useful for finding out about concrete scientific findings and the details of data collection and analysis.
- **Book Chapters**. Most useful for striking a balance between hard data and theoretical views.
- **Review Papers**. Most useful for gaining a lot of background information in a short amount of time.
- **Government Publications & Think-Tank Publications.** Most useful for topics that deal specifically with public policy issues.

the papers emanating from such institutions often are grounded in a particular political ideology.

In most cases, the publications that you will find most helpful are:

- Articles that relate *directly* to the specific topic of interest
- Articles that other researchers in the field view as high-quality work
- Articles that are considered to be state-of-the-art rather than outdated

How to Find a Good Starting Point

Your first task in reviewing the literature, then, is *not* to compile a long list of texts related to your topic. Rather, it is to find a few highly useful texts that can serve as a starting point for a well-focused search. It is much better to start off too narrow than too broad. If you begin by searching broadly, you are likely to camouflage a few highly-relevant articles within a large field of less relevant ones. By the time you make it to the articles that are of greatest relevance to you, you may already have plowed through more raw information than you can handle! If you begin narrowly, on the other hand, your attention will be focused from the very beginning on the information that is most useful to you, while at the same time you always have the option to expand your search more widely. Here are several different ways to find a starting point:

- Personal Contacts. An excellent way to find a few good sources is to talk to people who already know something about your topic. Colleagues, professors, and friends often will be able to direct you to important articles and well-known texts. You may wish to express an interest in a specific type of scientific article, such as review papers. If you do not know anyone who is a specialist in your area of interest, then you might consider emailing a faculty member or graduate student in the field with a clear, concise explanation of your research question and a request for a few good references. Many such email addresses can be found through university websites. (Be sure to emphasize that you know they are busy and appreciate their time. If you are a professional, you are more likely to receive a favorable reply to this kind of request if you also

explain succinctly how your organization applies social science knowledge to the real world.)

- The Social Science Citation Index. Another excellent way to identify a good starting point is to search through the **Social Science Citation Index** publication database (SSCI). This index is an especially useful tool because it provides information on how many times each article has been cited by researchers since its publication date. If you are particularly interested in locating review papers, keep an eye out for articles that seem to be evaluating broad theoretical issues, rather than testing specific hypotheses. In general, you should favor articles that have been cited heavily, since these typically are the ones that social scientists hold in the highest esteem. Highly controversial articles tend to be cited heavily as well, but such articles also are useful to read, since they often encapsulate a conspicuous (albeit contested) theoretical view on an issue. The SSCI database is available by subscription only, but many university libraries and some other libraries have standing subscriptions.
- Other Publication Databases. If neither of these approaches is available to you, then another way to find a few useful sources is to search the publication database that is most relevant to your field of interest. Check with your librarian to find out which databases are most applicable to you. At universities, some of the most frequently-used social science databases include **PsycINFO**, which contains publications relevant to psychology, **Sociological Abstracts**, which contains publications relevant to sociology, ERIC (the **Educational Resources Information Center**), which contains publications relevant to education, and **MEDLINE**, which contains publications relevant to the life sciences, especially medicine. Although most of these databases are available by subscription only, MEDLINE is freely available to the public through the U.S. National Library of Medicine. To search MEDLINE using the on-line PubMed search engine, log on to www.nlm.nih.gov. Each of these databases offers a useful starting point (although somewhat less useful than SSCI, in that none of them provides information on how frequently an article has been cited since its publication). When searching through these databases, you generally should favor articles that are relevant, recent, and written by people who are well known in the field or affiliated with a well-known institution.
- Scholarly Journals. If you do not already have a specific research question or topic firmly in mind when you begin your literature review, then a more general way to get started is to page through a number of scholarly print journals that are relevant to your field. Most university libraries have areas in which they display scholarly journals that have arrived in the past few months. In some cases, these journals may be displayed alongside newspapers and magazines. Be aware that the findings reported in non-scholarly publications should never be taken at face value. Whereas articles in scholarly journals are characterized by features designed to ensure high quality, non-scholarly publications are less reliable in this regard. If you come across an intriguing finding in a newspaper or magazine, be sure to look up the original scholarly work to which it refers.

Using an Internet search engine is not the best way to begin a literature review. The quality of information found on-line varies widely (refer to

Training Module #4: *Using the Internet to Find the Information You Need* for further information related to this point), and scholarly journals generally are not available through the Internet without a subscription. Moreover, the ratio of useful to useless information is substantially worse for website searches than for publication database searches. Thus, conducting a web search typically is considered an inappropriate way to carry out a literature review.

Best Ways to Begin a Literature Review:

1. **Personal Contacts**. Ask colleagues, professors, and friends.
2. **The Social Science Citation Index (SSCI)**. Favor articles that other researchers have cited heavily.
3. **Other Publication Databases**. Favor articles that are relevant, recent, and written by people who are well-known.
4. **Scholarly Journals.** Page through print journals relevant to your field.

Avoid the use of Internet search engines in the early stages of your search!

If You Are Not Affiliated with a University:

Public libraries tend to subscribe to more general databases, such as **InfoTrac** and **EBSCOhost**. (EBSCOhost is named for the Elton B. Stephens Company, but typically is referred to by its acronym.) These databases overlap with the more specialized databases found in universities, but they tend to be less comprehensive of a specific field. Check with the reference librarian at your local public library to determine which of the databases to which it subscribes will adequately suit your needs.

Many university libraries grant courtesy privileges to the general public, allowing visitors free access for a limited number of days per year. Individuals requiring additional days often can purchase a pass. In addition, some libraries offer an institution card that grants access to anyone from that institution for a fixed period of time (e.g., one year). Check with your local university library to find out about its specific access policies.

How to Search through Publication Databases

In most cases, you will be able to find useful articles in a publication database by following a series of four steps:

1. ***Generate Keywords***

   Before conducting a database search of any sort, sit down and make a list of words that are central to your topic of interest. A good way to come up with **keywords** is to gen-

erate a search statement. For instance, one search statement might be, "I want to find out about the effects that participating in a support group has on women who have been diagnosed with cancer." The key search terms in this statement are:

- support group
- women
- cancer

The more keywords you can generate, the more effective your search will be. Try to come up with variations on important words. As alternatives to "language," for instance, you might generate:

- languages
- linguistic
- verbal
- speak
- speaking
- spoken
- speech

If you know the names of researchers who have carried out relevant work on the subject, write their names down as well.

2. ***Access the Database***

Once you have come up with a set of search terms, you are prepared to seek out the catalog of your library. Library catalogs typically are accessible through computers on the library premises. In addition, many library catalogs now can be accessed on-line through **The Library Index**, located at www.libdex.com.

3. ***Search by Keyword***

Begin your search by entering as many keywords as possible into the appropriate social science database. A "keyword" search simultaneously searches the title, abstract, and subject list of all articles in the database. The more you restrict your search appropriately, the less likely you are to be deluged with extraneous information. Careful use of "and," "or," and "not," used in combination with parentheses, can help streamline your search (see Training Module #4: *Using the Internet to Find the Information You Need* for related options). Specifically, you should enclose interchangeable words within parentheses and conjoin them with "or," while conjoining different sets of interchangeable words with "and." Begin your search by entering as many keywords as possible. For example, a person who wanted to learn about the kind of language that Chinese doctors use toward their patients might enter:

"(language OR languages OR linguistic OR verbal OR speak OR speaking OR spoken OR speech) AND (doctor OR patient OR medicine OR medical OR hospital OR clinic) AND (China OR Chinese OR Hong Kong)."

4. ***Widen the Keyword Search***

If too few articles appear initially, remove less crucial keyword blocks (i.e., an entire set of parentheses) to expand your search

How to Search through Publication Databases:

1. ***Generate Keywords.*** Formulate a search statement and identify key search terms.
2. ***Access the Database.*** Seek out your library catalog either on-site or on-line.
3. ***Search by Keyword.*** Enter as many keywords as possible, conjoining them appropriately with "and," "or," and "not."
4. ***Widen the Keyword Search.*** Remove blocks of keywords as needed.

as needed. For instance, removing the language block, the doctor block, or the China block from the search above will yield a *much* larger number of articles. The tradeoff, however, is that this larger set of articles will be less directly relevant to your topic of interest.

In addition to searching by keyword, it also is possible to search by other fields, such as author, article title, date published, or journal title, as well as searching by more than one field in combination.

How to Expand the Scope of Your Search

Once you have found a few high-quality articles, you can use them to guide you to an ever-expanding list of related texts. Here are several different ways to expand the scope of your literature review:

- Move Backward in Time. One approach is to move from an article that you liked to the publications on which that article was based. To take this approach, read through the paper's footnotes and bibliographic information to identify prior publications that are directly relevant. Then locate these older texts by searching for them in the appropriate publication database (e.g., MEDLINE). Review papers are particularly useful in this regard, since they typically include a relatively long list of references.
- Move Forward in Time. Another way to expand the scope of your review is to move from an article that you found relevant to more recent publications written by authors who found that article relevant as well. Find these newer texts by searching for the article you liked in the Social Science Citation Index publication database.
- Search by Author. An additional way to expand your search is to focus on the authors of articles that you particularly like. Typically, an author who has written one paper that you appreciate is likely to have written other good papers as well. For this reason, it often is a good idea to run a search for each author of the paper in a few different publication databases. When taking this approach, you may wish to sort the search results by date, since state-of-the-art research tends to be favored over less current work.
- Browse Library Stacks. Finally, if you intend to conduct a literature review that will become relatively broad, then another good way to locate useful sources is to note the library classification numbers of the texts that interest you most, then spend a bit of time paging through the books that neighbor it in that corner of the library. Because library books are organized by content area, books that address similar topics are located near one another. In cases where you are searching for general information on a topic, reviewing the table of contents of various books is likely to result in a much quicker, more efficient search than wading through hundreds of on-line journal abstracts.

Keep a Paper Trail!

Whichever types of publications you pursue, make sure that you maintain a record of the literature that you have found useful. Make a note of citation details the very first time that you use a book, article, paper, or even website. Keep a record of the authors, the year of publication, and the article title.

If the paper appears in a journal, note the journal title, volume, and page numbers as well. If it appears in a book, note the publisher's name and the city in which the book was published, as well as the names of the editors (if applicable). If you found the text on-line, note the website address, the date that the page was last updated (if available), and possibly the section heading. However you record this information, make sure that you do so in a form that you will be able to understand when you refer to it later on. Doing so will save you a lot of time in the long run.

Now would be a good time for you to try your hand at Activity Set 1: How to Do a Literature Review.

How to Read a Scientific Article

Finding the Information You Need in an Empirical Paper

Across all the different varieties of social science literature, the publication type whose structure differs most from the familiar format of a newspaper essay or a magazine article is the empirical paper. Due to this unfamiliar structure, empirical papers often appear somewhat confusing to the uninitiated. Yet in fact, these papers use this organizational format expressly because it helps readers to extract the kind of information they need with maximum ease and efficiency. Do not allow the structure of an empirical paper to intimidate you! Instead, think of each section heading as a road sign that is designed to guide you to a particular type of content.

Empirical papers contain six distinct sections (although in papers that describe more than one study, some sections reappear).

1. Abstract. Within the **abstract**, you will find a summary of what the article contains. Some publication databases (e.g., PsycINFO) generate abstracts in response to a keyword search. However, this is not the case for every database. Abstracts are useful for getting a general idea of whether a particular paper is likely to be of use to you. Be careful, however, not to accept statements made in abstracts without reading through the paper, since abstracts frequently overstate the empirical findings of a study. The abstract appears on the first page of the article in some format that sets it off from the body of the text. It may or may not be titled.
2. Introduction. Within the **introduction**, you will find an overview of previous findings related to the issue being investigated, as well as discussion of important theories regarding the topic at hand. In the introduction, the authors generally make a case for why the topic they studied is of practical or theoretical importance. However, you should be aware that the information presented in an introduction rarely is representative of all previous work that has been carried out on a given issue. Most of the time, authors carefully select particular studies that will support the argument they make at the end of the paper. The introduction usually concludes with a clear statement of the specific research question being investigated, or a clear statement of what the researchers expected to find (i.e., the researchers' hypothesis). Because the introduction always appears at the beginning of the paper, it sometimes lacks a section heading.
3. Methods. Within the **methods section**, you will find information on the specific nuts-and-bolts of conducting the study. Read this section to learn about the people who participated, including information on how many there were, how they were recruited, their demographic characteristics (e.g., age, race), and so on. Also read this section to find out details regarding the materials and equipment that were used for data collection, such as information on questionnaire construction or the use of physical props. The methods section also contains a fine-grained explanation of the procedures through

which data were obtained, such as experimental manipulations or the creation of classification schemes. In short, this section offers a detailed how-to kit for any researcher who has an interest in replicating the study. (See Training Module #2: *All About Data Collection* for a more detailed consideration of data collection.)

4. Results. Within the **results section**, you will find detailed information about the specific findings that were obtained through data collection. Read this section to locate summaries of numerical data such as averages and percentages, often accompanied by tables, charts, or graphs. The results section also describes the mechanics of how the data were analyzed, specifying any statistical tests that were used and whether or not the results were significantly different from what might be expected to occur simply by chance. Some results sections also provide examples of actual participant responses, in order to give readers a better feel for the data. (See Training Module #3: *Understanding Data in Numbers, Words and Pictures* for help with data comprehension.)

5. Discussion. Within the **discussion section**, you will find a discussion of what the researchers believe that their study did and did not demonstrate. Whereas the results section presents study findings in terms of numerical summaries and statistics, the discussion section presents them in terms of what the numbers seem to mean. The discussion section typically is much more readable than the results section. On the other hand, it also is much less objective, since interpreting any given set of data always requires putting a particular "spin" on the findings. Authors typically situate their findings within the larger scope of what already is known in the field, arguing in favor of a particular theoretical view. Yet at the same time, a good discussion section also addresses the limitations of the study. Authors often point out that their findings may not generalize beyond a particular population, or that some extraneous factor may have influenced their results. The end of a discussion section frequently includes a brief conclusion that states the overall point of the paper and highlights research questions that remain ripe for future investigation. The conclusion may or may not be titled.

6. References. Finally, the **references section** is a bibliography that acknowledges all of the sources to which the authors referred while conducting their research and writing up the paper. If you already are familiar with the topic under investigation, then reading through the references section of a paper will give you a good idea of whether the authors are up-to-date on current research in the field. It also will give you a sense of whether or not their approach to the issue is broadly-based in the scientific literature. If you liked the paper, then this section will guide you to other useful texts that will allow you to expand your literature review "backward in time."

In some empirical papers, the results section and the discussion section are combined into a single section called *Results and Discussion*. When these two sections are combined in this way, (objective) numerical findings are presented alongside (subjective) interpretive commentary. This format occurs frequently in cases where an empirical paper includes more than one study. In such cases, each study is presented separately, with a *General Discussion* appearing at the end of the paper that incorporates all of the studies' findings into one coherent argument.

Standard Sections of an Empirical Paper:

1. **Abstract**. Summarizes the overall content of the article.
2. **Introduction**. Provides an overview of relevant research findings; specifies the research question or hypothesis under investigation.
3. **Methods**. Describes how the study was carried out.
4. **Results**. Describes how the data were analyzed; summarizes the findings.
5. **Discussion.** Explains what the findings mean and why they matter.
6. **References.** Specifies all of the sources to which the authors referred.

A Time-Efficient Approach to Reading Journal Articles

You should not read a journal article in the same way that you would read a magazine piece or a short story. Scientific papers pack many, many facts and details into a limited number of pages, and even experienced scientists usually have trouble understanding them completely from one straight read-through. Indeed, most experts who need to gain a thorough understanding of a particular article will re-read it several times. In most cases, down-shifting the speed of your reading to plow headlong through all of the material presented in an empirical paper is the wrong approach to take.

A more efficient approach is to come to a paper with a certain goal in mind, then search for the specific pieces of information that will help you achieve that goal. In short, you should actively seek out information, rather than passively receive it. This approach tailors your reading to your degree of interest in a topic and to your overall agenda. It focuses your energy on the information that matters most to you at the current time, while minimizing detours towards information that is relatively less useful. A good way to ensure that you are reading actively is to ask yourself the following series of questions:

1. ***Is this an article I should spend my time on?***

   Not every article that you encounter will be worth reading, particularly if your goal is simply to get a sense of the "big picture" surrounding an issue. At the personal level, you may find an article to be of little interest or of insufficient relevance to the task at hand. At a more general level, it may be of poor quality or of questionable importance to the field. It therefore is worth screening an article before you spend time reading it.

   To answer this question:

   - *Skim the information that is provided about the authors.*

     This will help you judge the quality of the content. Who are the authors? Are they affiliated with institutions that have credibility? Are you familiar with their work? Do you already know their likely position on the issue? Information about the authors typically is provided at the very beginning and/or the very end of an article.

- *Look at the date of publication.*

  Are the findings current? In some areas of research, such as the study of HIV/AIDS, scientific knowledge shifts very rapidly. In such cases, it is extremely important to ensure that the information you are reading is up-to-date. Publication date is somewhat less crucial, however, for topics that are less time-sensitive, such as bilingual education.

- *Read the abstract.*

  This will help you judge whether the paper is likely to be useful. Is the article an empirical paper or a review paper? What topic is under investigation? What demographic population is being studied? What arguments do the authors make? Read the abstract until it makes sense.

- *Scan the introduction to find the research question or hypothesis.*

  This will provide you with more detailed information regarding the paper's relevance. What specific approach do the researchers take to the topic of interest? The research question or hypothesis usually can be found toward the end of the introduction.

- *Skim the references.*

  If you already are somewhat familiar with the field of study, then this will help you judge both the quality of the content and the paper's usefulness. Do the authors cite well-known research? Is their perspective focused or broad in scope? Do they cite publications in topic areas that interest you?

If you determine that the article is worth your time, then the next question to ask yourself is:

2. ***What is this article's take-home message?***

Not every article that you deem worth reading needs to be read in great detail. In fact, only papers that have something especially useful to say should receive such treatment. Thus, the next step is to identify an article's central message.

To answer this question:

- *Read the introduction.*

  This will give you some background on the question that the researchers are investigating, as well as an idea of the argument that they plan to make. Why is the question worth investigating? What other findings are central to the topic? What would one expect to find, given current knowledge in the field?

- *Read the conclusion.*

  This will provide you with a "nutshell" version of the authors' message. What is the overall point of the paper? Do the researchers make any recommendations for future action? Not every paper has a conclusion, but for those that do, the conclusion is located at the end of the (general) discussion section.

If your overarching goal in reading the journal article is simply to keep up on the current state of the field, then you may wish to stop at this point. If, however, you decide that the article is of particular interest to you, then the next question to ask yourself is:

3. ***What are the details of this study's research findings?***

Not every article that you find to be of particular interest needs to be read in its

entirety. If you do find an article especially useful, however, then you will want to have a solid understanding of the researchers' arguments. (If you have gotten to this point, you probably should photocopy the article. Doing so will save you time in the long run.)

To answer this question:

- *Peruse the tables, graphs, and figures located in the results section.*

  This will give you a general idea of what the researchers found. Circle or highlight key findings.

- *Read the discussion section.*

  This will give you a clear view on what the researchers believe their findings show. How do their findings fit into the larger topic of interest? What do their results contribute to the field? What are the limitations and drawbacks of their data? What are promising avenues for future data collection? Underline or highlight important points. Put a check mark next to those you agree with. Put a question mark next to those that seem confusing or unlikely. Circle words that are unfamiliar to you. Jot down comments and ideas.

If your overarching goal in reading the journal article is simply to inform yourself about studies that have been carried out on a given issue, then you may wish to stop at this point. If, however, you anticipate collecting your own data related to this topic, or if you have a particular interest in critically evaluating research within this field of study, then the next question to ask yourself is:

4. ***What are the details of data collection and analysis in this study?***

If you plan to collect data on a related topic, then you will want to have a clear awareness of exactly what the researchers did and exactly what they found.

To answer this question:

- *Read the methods section.*

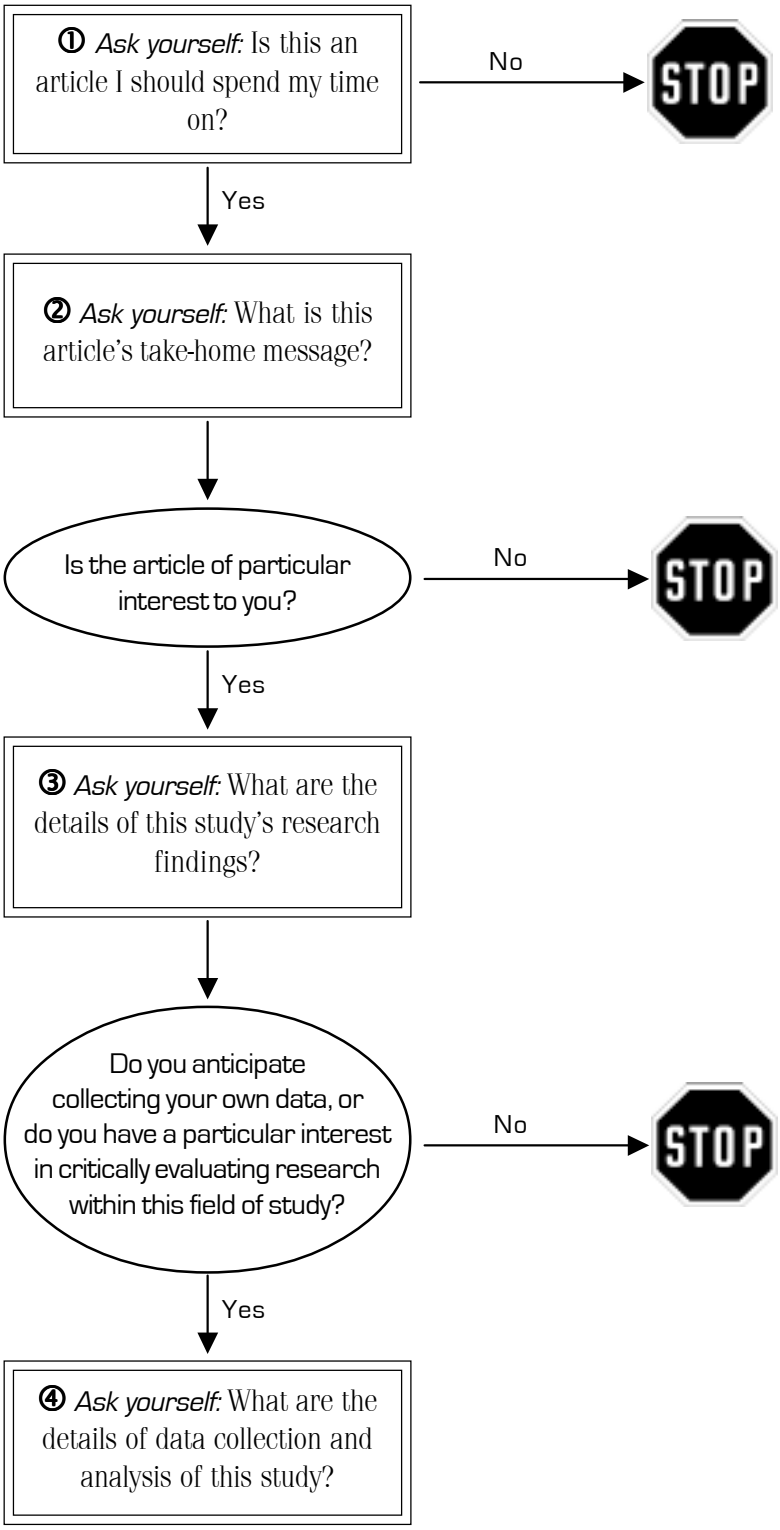
  This will provide you with the details of how the data were collected. Who were the participants? What did these participants experience? How did the researchers measure the phenomenon of interest? If you have some background in data collection, then consider the strengths and weaknesses of the data collection process.

- *Read the results section.*

  This will provide you with the details of how the data were analyzed. What comparisons were drawn? What relationships were considered? What statistical analyses were used? If you have some background in data analysis, then consider whether you agree with the researchers' interpretation of their data.

Asking yourself the series of questions above as you look through empirical journal articles will help you to remain an active reader, resulting in a literature review that is more efficient, more productive, and ultimately more satisfying.

A Time-Efficient Approach to Reading Journal Articles



At this point, you may wish to solidify your understanding of empirical articles by working through Activity Set 2: How to Read a Scientific Article.

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END OF SAMPLE

This sample contains chapters 1-2. To view the complete module or purchase other Data and Internet Literacy Series modules, view http://www.socio.com/dil/ or download the complete resource for *free* as part of the HIV/AIDS Research and Prevention Online Library. http://www.socio.com/hivrap.htm