



Tips for Searching Article Databases

INTRODUCTION

Finding the right article and other materials is not happenstance. Creating a strategy is essential for successful search results. Knowledge about information resources and search strategies will bring your search to a successful conclusion, even when you are not familiar with the topic at hand.

General Search Strategy

- Create a search statement using keywords
- Use bibliographic databases appropriate to your topic. Checking more than one can be very useful to pick up unique titles
- Use keywords and controlled language
- Use Boolean searching
- Change approaches as necessary – gathering information is not a linear process
- Continue to identify applicable keywords and controlled vocabulary to go back and check in the selected database(s) and other resources

CREATING A SEARCH STATEMENT

The most difficult part of conducting a good search is usually not figuring out which buttons to push, but rather in figuring out which terms to use and how to combine them to find literature that is “on topic.” This requires a strategy that will optimize the number of relevant titles that you can find. One component of this strategy is the search statement.

A search statement is a query that identifies the information you are searching for in a bibliographic database in a way that can be utilized by the databases search engine for retrieval of records. Many times a topic can be described in many different ways. As there are over 500,000 words in the English language, there are undoubtedly numerous words that could be used to describe the topic. Where to begin?

- Break your search (AKA search) statement/question into concepts and keywords.
- Note other possible natural vocabulary keywords and applicable concept terms while doing background research.
- Identify synonyms of those keywords.
- Create concepts of 1-3 words.

Example

Do not type in “stem cell methodology for changing valine to glutamic acid in hemoglobin” because the database program may search for exactly those words in exactly that order. There may be very relevant materials that do not have this phrase exactly, but have the concepts of that phrase. Break your search statement down into concepts. In the search statement example below, your main concepts would be “sickle cell anemia”, “hemoglobin”, and “stem cell methodology”. The concepts you identify may have other words that mean the same/nearly the same thing (synonyms) or relate. The search statement example below may also have additional concepts of interest to identify synonymous or related concepts (e.g., valine and glutamic acid), upon which you can further develop your strategy.

Search Statement:

Identify potential **stem cell methodology** that could be used for changing valine to glutamic acid in **hemoglobin** of people with **sickle cell disease**.

CONCEPT 1	CONCEPT 2	CONCEPT 3
Sickle cell anemia	Hemoglobin	Stem cell methodology

Identify Related Keywords

CONCEPT 1	CONCEPT 2	CONCEPT 3
Sickle cell anemia	Hemoglobin	Stem cell methodology
Sickle cell disease	Beta chain	Stem cells
Hemoglobin S disease	Beta-globin gene	Gene silencing
globulinopathies	codon nucleotide 6	Gene splicing
	(middle) AT	Gene transfer techniques
	Valine	Targeted gene repair
	Glutamic acid	Genetic engineering
		RNA antisense

UTILIZE DATABASE FEATURES

In order to search effectively it is important to become familiar with the database that is being used. Knowing the shortcuts and quirks of the database will save time by decreasing frustration and understanding the system. Some important characteristics to identify are which element truncates words, how to search for a phrase, and how the Boolean operators are used. To become familiar with the database read the database guides, look at examples in the guides, and take the tutorials. If a search does not give the results anticipated, read the database help pages to determine what the database is doing.

The searching methods vary from database to database; however most have a basic search function and an advanced search function. Some databases will also have an intermediate search function. These search functions are also highly variable, which is why it is important to become familiar with the database. Depending upon the goal of the search will depend on which search function to use.

Basic Searches

Typically, the basic search box only searches one field, which may or may not be predetermined. The basic search is useful to determine how big the collection of articles related to the topic is, which will help in generating search strategies. It is also helpful when doing a known item search, for example when the exact title is known.

Advanced Searches

The advanced search functions give more control to the user, and allows for a more refined search. Multiple search terms in multiple fields can be searched for simultaneously. The advanced search should be used when the collection of interested articles is large and needs to be narrowed. It is also useful when information from more than one field would help in locating items of interest, such as when looking for an author with a common name, which can be narrowed by combining name with subject.

Limits

Many databases have limits that control the available articles by specified parameters, for example, by date, format, material type, language, or location. This feature is helpful to eliminate records that are outside the selected limits, such as if only review articles are needed, or if only articles in the last five years are of interest.

Controlled Vocabulary

Many databases use controlled vocabulary. Some use Library of Congress Subject Headings (LCSH) or Medical Subject Headings (MeSH), but there are also some that create their own controlled vocabulary. It is important to note the controlled vocabulary for the database in use. This will help to refine the search and direct the search into the appropriate area. (See next section)

Other Features

All databases have their own unique features for doing typical search procedures, as well as unique operations. For instance:

- Search within results.
- Analyze results.
- Search history.
- Search by taxonomic data.
- Related articles and links.

KEYWORDS AND CONTROLLED VOCABULARY

Many bibliographic databases have some form of "controlled vocabulary," also referred to as "standardized vocabulary." One term is selected as the "preferred" word for describing and searching for words and concepts in citations; these words and concepts are referred to as "subject" terms or "descriptors." Words selected for controlled vocabularies are decided by specialists in information science and/or academic disciplines related to the terms and concepts. "Keywords" are descriptive words that may be found in the title, subject headings (descriptors), contents note, abstract, or text of a record in an online catalog or bibliographic database. A "keyword search" is also known as free-text searching.

Word	Definition *
Descriptor	A preferred term, notation, or sequence of symbols assigned as an access point in the bibliographic record representing a document to indicate one of the subjects of its text (synonymous in library cataloging with the term subject heading).
Free-text search	A search of a bibliographic database in which natural language words and phrases appearing in the text of the documents indexed, or in their bibliographic descriptions, are used as search terms, rather than terms selected from a list of controlled vocabulary (authorized subject headings or descriptors).
Keyword	A significant word or phrase in the title, subject headings (descriptors), contents note, abstract, or text of a record in an online catalog or bibliographic database that can be used as a search term in a free-text search to retrieve all the records containing it.
Subject heading	The most specific word or phrase that describes the subject, or one of the subjects, of a work, selected from a list of preferred terms (controlled vocabulary) and assigned as an added entry in the bibliographic record to serve as an access point in the library catalog .

Definitions from: Reitz, J. M. (2004-6). ODLIS — Online Dictionary for Library and Information Science. Westport, CN: Libraries Unlimited. Retrieved June 15, 2007, from <http://lu.com/odlis/>.

Thesaurus

A thesaurus is “an alphabetically arranged lexicon of terms comprising the specialized vocabulary of an academic discipline or field of study, showing the logical and semantic relations among terms, particularly a list of subject headings or descriptors used as preferred terms in indexing the literature of the field” (Reitz, 2004-6) Bibliographic Indexes with controlled vocabulary usually have a print and/or online thesaurus or list which gives the preferred subject words. *PubMed (MEDLINE)*, for instance, uses the Medical Subject Heading (MeSH) “Colony Counts, Microbial” for all articles dealing with bacterial counts, fungal, counts, spore counts, and so on. Searching the indexes controlled vocabulary term for a concept can increase the number of articles you find. Print versions of thesauri have been discontinued by many index producers, sometimes transiting the content into the electronic bibliographic database counterpart – and sometime not. A librarian can help you locate available print versions, including earlier versions that may still be useful for exploring terms to search.

Library of Congress Subject Headings

Since 1898, the Library of Congress Subject Headings (LCSH) list now listing over 280,000 subject headings, is considered the most comprehensive list of subject headings in the world and is the only one accepted as the worldwide standard. Although the print editions are still published (latest being 30th ed., 2007), these subject headings are included in many online library catalogs, including UIUC Library's Online Library Catalog (OLC). Subject headings can be searched or browsed in the OLC. Most bibliographic records include LCSHs that were assigned when the record was created. These assigned LCSH are hyperlinked to other records with that assigned heading. Relationships between subject headings are included for broader terms, narrower terms, and related terms as well as headings that are used for terms or may be of interest. For example:

References for: Sickle cell disease
The references listed below may also contain information related to your search.

References may include:

- See references
- See also references
- Search Under
- Broader Term

Reference Info
See: Sickle cell anemia

Medical Subject Headings (MeSH)

Medical Subject Headings (MeSH) is a controlled vocabulary thesaurus of terms created by the National Library of Medicine and used for PubMed (MEDLINE) article records. Over 24,000 descriptors are arranged in a hierarchical manner called the MeSH Tree Structures. A print edition of MeSH is available from the Government Printing Office. The [MeSH Database](#) is freely available for searching in PubMed (MEDLINE). See [The Basics of Medical Subject Headings \(MeSH\)](#) for more information.

TRUNCATION AND WILDCARDS

In many bibliographic databases, online catalogs, and search engines it is possible to refine searches using a technique called ‘truncation.’ Truncation allows you to search for variant forms of a word as a single search concept, rather than identifying and entering variant words of the keyword as individual concepts. Variations of words in keyword searches can be searched simply by adding or replacing characters at the ends, beginning, or middle of the word with a truncation symbol, also known as a ‘wildcard.’ This wildcard “stands in” for the part of the word that may have variations. Common truncation symbols included the *, #, \$, and ?. Some databases may even use more than one of these symbols with specific criteria for their use. Examples:

microb*	bacteri*	behavio*r	disrupt*r
microbes	bacteria	behavior	disruptor
microbiology	bacterium	behaviour	disrupter
microbial	bacterial		
microbacteria			
microbiologist			
microbiologists			

Sometimes there can be too much of a good thing. Truncating too early at the end of the word can broaden the search to unrelated topics. For instance truncating a word to gen* to retrieve topics related to genetics and genomics will also pick up many words that are totally unrelated.

Gen*	labor*
Will pick up useful variants ...	Will pick up useful variants ...
genome	laboratory
genomics	laboratorial
gene	laboratories
genotype	laboratoire
genetic	laboratório
genetics	laboratori
...as well as unuseful ones	laboratorium
divergence	laboraroty (even picks up misspellings!)
genera	... as well as unuseful ones
genus	labor [intensive]
GenBank	labor [and delivery]
genera	laborious
intergenic	

When preparing to truncate your search term, it is important to know what capabilities the resource being used has as well as what truncation symbol(s) is used, which is usually a simple visit to the resources "Help" section. Biology Library [Resource Guides](#) include truncation and wildcard information for commonly used electronic life sciences bibliographic databases and the Library Online Catalogs are available. Or just [Ask-A-Librarian](#) in if you need further help.

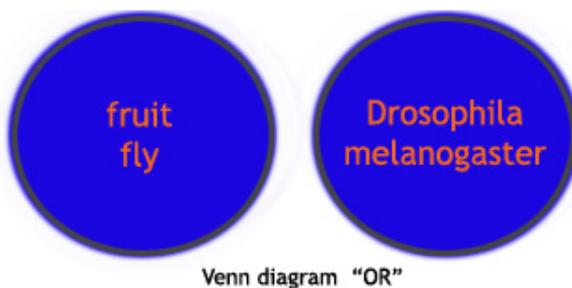
COMBINING TERMS (BOOLEAN SEARCHING)

Search options vary between bibliographic databases, online library catalogs, and search engines. Some resources provide a single search box option for entering terms; and some provide a number of search options, such as a 'Quick Search,' 'Advanced Search,' 'Boolean Search,' or some combinations or variations thereof. "Quick Searches" may have just one box for the search term(s) or there may be a box with a menu of selected record fields that can be chosen from. 'Advanced Search' options typically have more than one box for multiple concept terms as well as a menu of all record fields available to choose from. A 'Boolean Search' option may be available, either as one of the search options or as part of 'Quick Search' and/or the 'Advanced Search' that allows one to combine terms utilizing the connector words 'AND,' 'OR,' and 'NOT' (also known as Boolean operators) to broaden or narrow your search concept..

Boolean operatives in normal, everyday usage may have opposite relationships than when they are used for Boolean search strategies in electronic resources. For instance in regular speech 'AND' means 'along or together with,' which adds or increases the relationship between the terms, e.g. 5 AND 5 = 10. In ordinary, daily communication 'OR' can be used to connect two concepts so that either one or the other is selected, and thus reduces the end-result, e.g., Either this needs to be done OR that needs to be done, but not both.

Use 'OR' to Broaden Search

In Boolean strategies, 'OR' expands the search to include all records that contain either terms. To broaden your search, think of synonyms and related terms for your search query, and then combine them using "OR". In the example below, a synonym for "fruit fly" might be "Drosophila melanogaster." Keep in mind that some concepts using the same words, may be found as individual words *and* as a single word, for example "bird song" or "birdsong." Truncation may not be possible in such circumstances, but using "OR" to connect the terms will work to pick up either of the terms if they are there.



Use 'AND' To Narrow Search

For Boolean search strategies, 'AND' actually narrows the search results. Using 'AND' is directing the electronic resource to produce records that include all the search terms that were used – all term concepts that are entered must be in each of the resulting records. The more search terms used, the more specific and thus narrow the results will be.



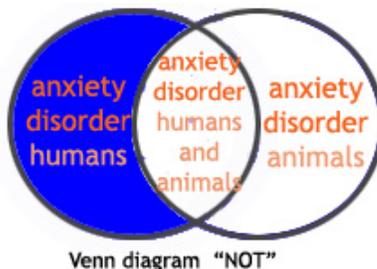
Relevance of the retrieval may depend on the proximity of the words to each other.

This guide is available on line at <http://www.library.uiuc.edu/bix/pdf/genguide/searchtips.pdf>

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Use 'NOT' To Narrow Search

The Boolean connector "NOT" may come in handy, but should be used with care. It is used to eliminate records, as in "anxiety disorders NOT animal" for anxiety disorders related to humans, not animals. But searching with this query one would miss a very relevant review *Neurobiology of Anxiety Disorders and Implications for Treatment* that reviews research on the neurobiology of fear and fear conditioning "and examine its implications for these anxiety disorders, with a focus on identifying potential therapeutic strategies" (Garakan, A., Mathew S.J., & Charney D.S., 2006). This research summary refers to animal studies which form the basis for understanding many human biological conditions, including anxiety. Using the connector "NOT" can cause much significant research to not be in the results.



When preparing to combine your terms in a search query, it is important to know how this is done in the database you are using, which is usually a simple visit to the resources "Help" section. Biology Library [Resource Guides](#) include Boolean information for commonly used electronic life sciences bibliographic databases and the Library Online Catalogs. Or just [Ask-A-Librarian](#) in if you need further help.

REFINE AND REPEAT SEARCH STATEMENTS

As searches are performed and familiarity with the topic and database increase, new keywords will become obvious. These words will be in titles, bibliographic subject words, abstracts, and the full-text of the publication. It is important to use these words advantageously. The search process is not linear, so as these words become available refine the search process taking new words into account. This may also affect the topic statement/question. There might not be enough information on the intended topic, but there likely are articles on a similar, tangential topic. Change your search strategy as necessary to incorporate new words.

OTHER SOURCES OF HELP

If you need more help, the manuals for the electronic databases are kept near the stations along with other helpful material. The single most useful thing you can do, however, is to [Ask A Librarian](#) for help. In addition to giving you general help with the systems, most databases have some form of advanced searching capability beyond the controlled vocabulary discussed, and a librarian can help you with that as well.

WHAT NOW???

Full-text articles are available for many titles in online databases, and requires no further searching. But if only an article citation/abstract is provided you will need to pursue locating the item locally in the UIUC Online Research Resouces (ORR) database <<http://www.library.uiuc.edu/orr/>> or Online Library Catalog <<http://www.library.uiuc.edu/catalog/>>, or may be requested through the UIUC Information Resource Retrieval Center (IRRC) interlibrary loan at <<http://www.library.uiuc.edu/irrc/>>.

References

Garakan, A., Mathew S.J., & Charney D.S. (2006). Neurobiology of anxiety disorders and implications for treatment. Review. *The Mount Sinai Journal of Medicine*, 73(7), 941-9.

Reitz, J. M. (2004-6). ODLIS — Online Dictionary for Library and Information Science. Westport, CN: Libraries Unlimited. Retrieved August 15, 2007, from <http://lu.com/odlis/>