

14 - BOOLEAN OPERATORS & THE GRAMMAR OF SEARCHING

As you expand your repertoire of search capabilities, it will eventually become necessary to use “Boolean Operators” and other grammatical expressions for advanced searching. These enable you to associate and define terms in various manners in order to be more precise about the information which you retrieve. To this point, you have used the Internet to get into MEDLINE and other highly structured databases. In such structured environments, it is easier to be more loose in your procedures because the prescribed routines and the selectivity of the database compensate for your imprecisions. However, when you venture out into a highly unstructured environment such as the World Wide Web with its 1 billion plus records and that expanding exponentially, you will need to be more structured yourself in order to avoid being overwhelmed and confused. Learning the basic search grammar and studying the advanced syntax of your favorite search engine will seem difficult at first; however, there are less than 10 ideas which you need to learn - it just takes some practice.



DoctorInternet

When you searched MEDLINE, you used the conjunction “AND” for retrieving records in which two or more terms had been used. That conjunction is called a “Boolean” operator, having been named after the mathematician, George Boole (see insert). There are two other conjunctions or Boolean operators - “OR” and “NOT”. Here is what each one of these commands or operators does.

When you associate two or more terms with “AND” (e.g., "hypertension" and "diet" and "france"), the computer looks for only those records which contain **all** of those terms in a particular record. It will not retrieve records in which only some of the terms are included. This enables you to narrow your selection by retrieving only reports which, most likely, are

14 - BOOLEAN OPERATORS

relevant to your specific interest. Be advised that in the records which you obtain, although each of the words which you used will be in each record, they may or may not be associated in the way in which you intended. You will have to read the citation to know precisely.

For situations in which you think that people might use synonyms or alternative terms for the same thing, you can use the “**OR**” command (e.g., "hypertension" **OR** "high blood pressure"). In that case, the computer will retrieve records with either one or the other term or both terms. This is a broader reconnaissance; and it will retrieve more records than when one uses a single term.

If you wish to exclude an association between terms, then you would use the “**NOT**” command (i.e., "hypertension" **NOT** "salt"). This would not retrieve any record in which the second terms were used. This latter command has more limited value because it may exclude many relevant records.

Other ways of delimiting a search are described in the following table.



George Boole (1815-1864) was an English mathematician who first applied algebraic concepts to human logic. Prior to his time, all logic was linguistic and structured in normal grammar. Largely self-taught, he published several important papers as a non-academic and was subsequently appointed to be the first Professor of Mathematics at University College Cork (then called Queen's College) even though he held no university degree. The mathematical logic which Boole invented was strictly a theoretical, intellectual exercise with no practical application in his day. However, when telephone switching and electronic computers were invented, his form of logic became basic to their design and binary information processing. His books, *The Mathematical Analysis of Logic* (1847) and *An Investigation of the Laws of Thought* (1854), form the basis of present-day computer science and cybernetics. Although rendering human logic to mathematical terms eventually proved to be inadequate, the effort did enable us to do some types of thinking with machines, which spawned our present, high-technological civilization.

He was a colleague of another famous logician and mathematician, Charles Dodgson, a.k.a Lewis Carroll.

14 - BOOLEAN OPERATORS

ELEMENT	EXAMPLE	EXPLANATION
AND	hypertension AND diet	This is used by virtually search engines. It obtains only citations, each of which contains both subject words.
+	hypertension + diet	The same as AND; it is used as a short-cut by some Internet search engines. It seems superfluous.
OR	aging OR ageing	Obtains citations in which each term is used independently of the other and citations in which both word are used. This is used mostly for synonyms.
NOT	hypertension NOT salt	This retrieves all citations on the first term, "hypertension", but excludes those which contain the nullified word, "salt".
-	hypertension - salt	The same as NOT and is used as a short-cut by some Internet search engines - again, probably superfluous.
*	hyperten*	Retrieves any permutation of the root word - i.e., hypertens <u>ion</u> , hypertens <u>ive</u> , hypertens <u>e</u> , etc.
title:	title: hypertension	Used by Internet search engines to restrict the search to the "title" of a web-page. Using this and the "URL" search below can be efficient ways to find sites about a very particular topic.
url:	url: hypertension	Used by Internet search engines to restrict the search to the "URL" of a web-page.
" "	"hypertensive syndrome"	Quotes will restrict the search to citations which contain that precise phrase.

Different search engines use Boolean operators and the various functional tags in different ways; and each will have some extended commands. Once you find an appropriate search engine, then you will have to spend some time learning its unique routines.