

Title:

PubMed and Boolean Logic Handout

“PubMed Tutorial for Veterinarians” URL:

http://cases.vetmoodle.org/CET_CoursePlayer/demo1/public/pubmed.html

Digital collection of the documents for the “PubMed Tutorial for Veterinarians”:

<http://hdl.handle.net/1969.1/158203>

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PubMed for Veterinarians: A Feline Hyperthyroidism Example

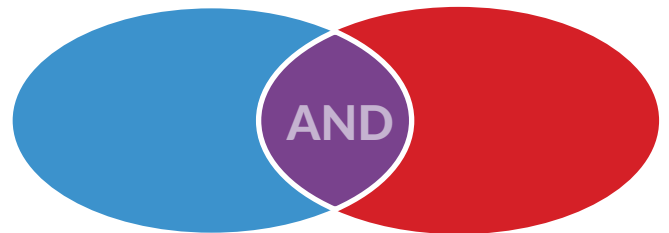
PubMed and Boolean Logic

Boolean Logic describes the relationship between search terms. Boolean operators (**AND**, **OR**, **NOT**) define the relationship. This resource illustrates how these three Boolean operators return search results.

Boolean Operators:

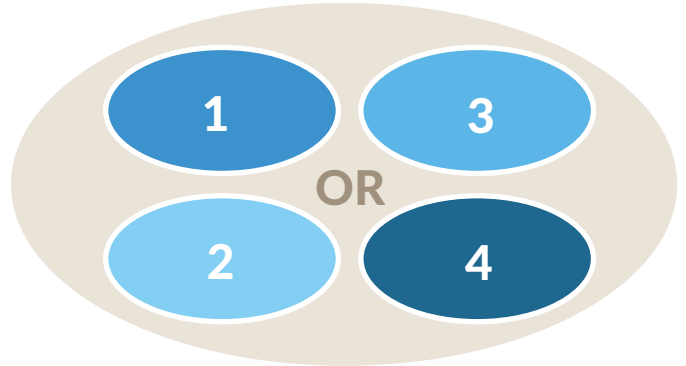
AND narrows a search, or part of a search, to be more specific.

In this model, you are searching for blue **AND** red. Blue represents one search term. Red represents one search term. Purple represents results that include both red and blue terms. If you use **AND**, you will retrieve only the purple results.



OR broadens a search, or part of a search.

In this model you are searching for shades of blue. Each of these is a different shade of blue, but they are all blue and any would be an acceptable result. Therefore, your results would contain all of the four blue search terms. For Boolean logic, this would look like: blue 1 **OR** blue 2 **OR** blue 3 **OR** blue 4.

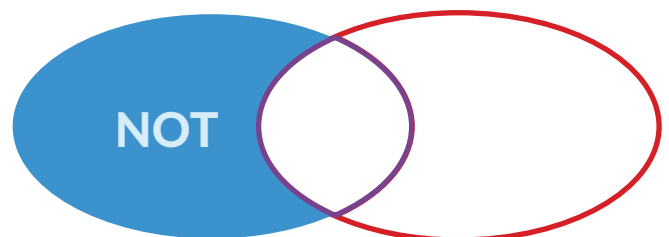


NOT eliminates items from your results.

Exercise caution when using **NOT**. You could eliminate a desirable result because it is within the same result as an undesirable result.

Imagine you are searching for blue **NOT** red. In the first example, we illustrated that the purple circle includes both blue **AND** red items in your results.

Blue **NOT** red means the result is missing the items that are red, and items that are both blue **AND** red (the purple circle), so that you have only results that are strictly blue.

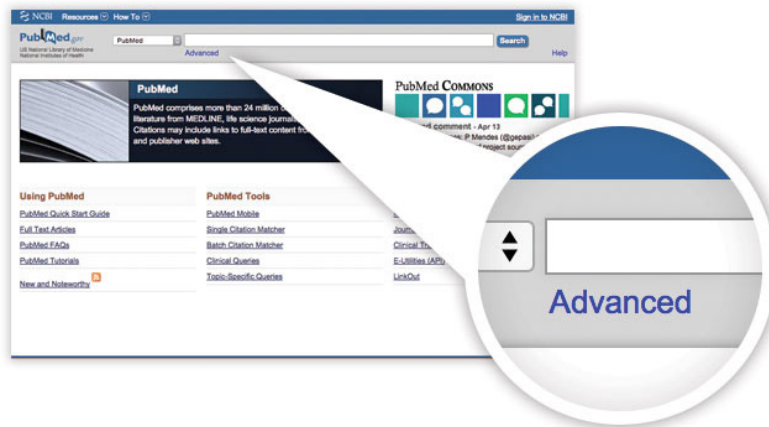


PubMed Boolean Approach:

PubMed automatically uses the **AND** relationship between the terms entered in the home search bar. You can view precisely how PubMed interpreted your search terms in the search details box on the results page.

If you need to change the interpretation of your terms, the PubMed *Advanced Search Builder* allows you to construct a search choosing your own Boolean relationships.

From any PubMed screen with the search box at the top, look below the PubMed search bar for the word **Advanced** and click on it.



This takes you to the PubMed *Advanced Search Builder*. Remember, PubMed automatically connects your search terms with **AND**; however, from this screen you can control for other Boolean options.

Terms you enter on the same line still default to **AND**. For example, cats hyperthyroid is still interpreted as cats **AND** hyperthyroid the same as using the single PubMed search box at the top of most PubMed pages.

A screenshot of the PubMed Advanced Search Builder interface. The page title is "PubMed Advanced Search Builder". At the top, there is a search bar containing the text "cats hyperthyroid". Below the search bar, there is an "Edit" link on the left and a "Clear" link on the right. The "Builder" section contains three search fields. The first field has a dropdown menu set to "All Fields" and contains the text "cats hyperthyroid". To the right of this field is a "Show index list" link. Below this are two more search fields, each with a dropdown menu set to "AND" and "All Fields", and a "Show index list" link. At the bottom of the builder section, there is a "Search" button and an "Add to history" link. Below the builder section is a "History" section. Four numbered callouts (1, 2, 3, 4) point to specific elements: 1 points to the first search field, 2 points to the search bar, 3 points to the "Search" button, and 4 points to the "Add to history" link. Four text boxes provide instructions: "Enter terms here." points to the search bar, "Search terms appear above as you enter them." points to the search bar, "Click Search to go to the results." points to the "Search" button, and "Click Add to history to stay on this page and view the number of results for each search here." points to the "Add to history" link.

To control the Boolean operator, you would type one term into the first field bar, type the next term in the following field bar, and so on.

Here the same search is constructed differently:

We entered cats on the first line and hyperthyroid on the second.

PubMed interpreted the Boolean AND because we added it in the second field bar.

We selected AND between the two search bars to command PubMed how to search.

The screenshot shows the PubMed Advanced Search Builder interface. The search query is "(cats) AND hyperthyroid". The Builder section shows two search bars: the first contains "cats" and the second contains "hyperthyroid", with "AND" selected between them. The History table shows the search results.

Search	Add to builder	Query	Items found	Time
#1	Add	Search cats hyperthyroid	451	16:33:22

Below, note the search history. You can see the differences with this second search. In the first search we do not see the **AND** because PubMed inserted it by default. In the second search we see it because we commanded PubMed to use **AND** by using multiple field lines in the Advanced Search Builder.

The History feature is efficient for when we want to create more complex searches and use multiple Boolean operators.

The screenshot shows the PubMed Advanced Search Builder interface. The search query is "(cats) AND hyperthyroid". The Builder section shows two search bars: the first contains "cats" and the second contains "hyperthyroid", with "AND" selected between them. The History table shows the search results.

Search	Add to builder	Query	Items found	Time
#2	Add	Search (cats) AND hyperthyroid	451	16:37:54
#1	Add	Search cats hyperthyroid	451	16:33:22

For this final example, below is a possible search for *dirofilaria immitis* (heartworm) in both dogs and cats. There are several components to this search. We need to tell PubMed that we will accept either dogs or cats, but we want *dirofilaria immitis* to be in each result. We need to be careful where the **OR** and **AND** are placed so that we search for ((dogs **OR** cats) **AND** *dirofilaria immitis*) and do not search for ((dogs) **OR** (cats **AND** *dirofilaria immitis*)).

The screenshot shows the PubMed Advanced Search Builder interface. At the top, there are navigation links for 'PubMed Home', 'More Resources', and 'Help'. The main heading is 'PubMed Advanced Search Builder' with a 'History deleted' indicator. The search query is displayed as '((dogs) OR cats) AND dirofilaria immitis'. Below the query is an 'Edit' link and a 'Clear' link. The 'Builder' section shows three rows of search terms: 'dogs', 'cats', and 'dirofilaria immitis'. The first row is selected with 'All Fields'. The second row is connected to the first by an 'OR' operator. The third row is connected to the second by an 'AND' operator. At the bottom of the builder is a 'Search' button and an 'Add to history' link. A 'History' section is visible at the very bottom. Four callout boxes provide explanations: 1. Points to the 'OR' operator between 'dogs' and 'cats'. 2. Points to the 'OR' operator between 'cats' and 'dirofilaria immitis'. 3. Points to the 'AND' operator between the 'cats AND dirofilaria immitis' group and 'dogs'. 4. Points to the final constructed search query.

On the first line we entered the term dogs.

For the second line we selected the Boolean OR for the term cats.

For the third line, we selected the Boolean AND for *dirofilaria immitis*.

Note how PubMed constructed the search.