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

Funding statement:

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.
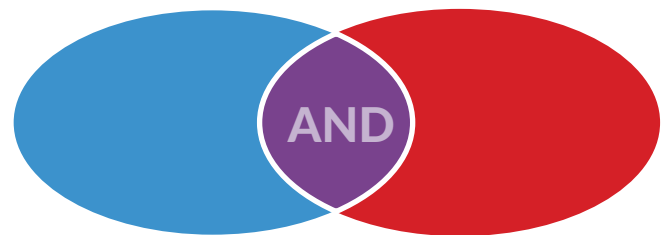
OR broadens a search, or part of a search.

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.
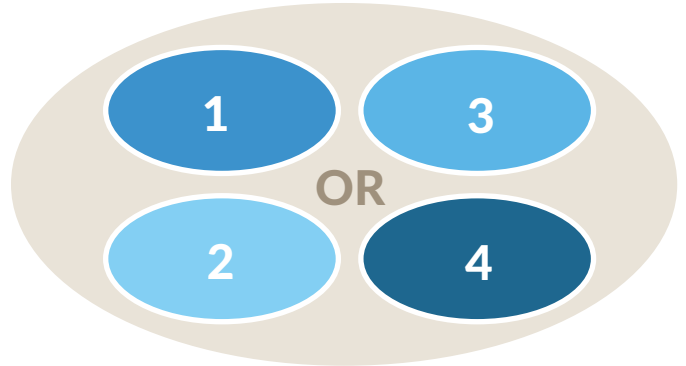

NOT eliminates items from your results.

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.
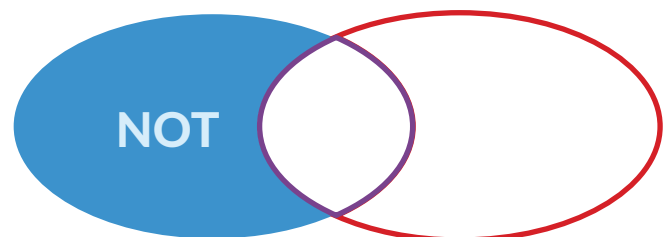
PubMed Boolean Approach:

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.

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.

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.

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*)).

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.

PubMed Advanced Search Builder

((dogs) OR cats) AND dirofilaria immitis