**Boolean Operators**

AND OR NOT are referred to as Boolean operators. Boolean operators are used to combine search concepts and either increase (OR) or decrease (AND, NOT) search results.

### AND
- The **AND** operator is used to **narrow a search or decrease results**.
- BOTH terms are found within all items retrieved.
- Only items within the intersection of circles A AND B will be retrieved.

**Example:**
cholesterol AND dementia
Both terms are found in items retrieved.

### OR
- The **OR** operator is used to **broaden a search or increase results**, and is often applied to synonymous terms.
- All terms in either circle A or circle B, or both will be retrieved.

**Example:**
Lipitor OR Atorvastatin
Either or both terms are found in items retrieved.

### NOT
- The **NOT** operator is used to **narrow or decrease results**.
- Only items in the partial circle A will be retrieved.
- B is **excluded** from all items retrieved.

**Example:**
memory NOT dementia
All items that use the term memory will be retrieved.
Items that mention dementia will not be retrieved.

**Caution:** The NOT operator is the least used operator, since it may exclude potentially valuable items.
Using Multiple Boolean Operators (Nesting)

Round brackets “( )” are strategically placed around search terms to tell the database what terms belong together and what terms to search first. This practice is referred to as nesting.

In a search statement with multiple operators, a search will be run in the following order:

(search terms in brackets)  ➞ NOT  ➞ AND  ➞ OR

Remember:

• When using nesting, always use an equal number of “opening” and "closing" parentheses.
• When using advanced search options, using brackets becomes very important. When combining sets of searches (e.g. PubMed Advanced Search) always make sure you use brackets correctly.

Example:

elderly OR aged AND Lipitor

• Without nesting, you will get a large amount of results because “aged AND Lipitor” are being searched first, with elderly being added at the end with OR.

Versus

(elderly OR aged) AND Lipitor

• All terms and Boolean operators within brackets will be searched first, and then combined with Lipitor. This search produces fewer results because the OR’d terms are searched first, with Lipitor being added to the result with AND.

Example Using Multiple Sets of Brackets:

elderly OR aged AND Lipitor OR Atorvastatin

(elderly OR aged) AND (Lipitor OR Atorvastatin)

• All terms and Boolean operators within each set of brackets will be searched first. The results of each bracketed search with be combined using AND.

Truncation

Truncation broadens your search to include various word endings and spellings. To use truncation, enter the root of a word and put the truncation symbol at the end.

Truncation symbols vary by database. Astrisk (*) is the most common, however, some databases may use: !, ?, or #.
Examples:
cholester* = cholesterol, cholesterin
cancer* = cancers, cancerous

Questions?
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