Systematic Review Service

Boolean operators

SO HOW LOGICAL ARE *YOUR* THOUGHTS ON BOOLEAN?

So how logical are *your* thoughts on Boolean?

Most people think they know the basics of Boolean Logic;

Red	AND	Blue
Red	OR	Blue
Red	NOT	Blue

In the example above, the logic does not seem very problematic;

1) The painter is interested in the colours red and blue. These would appear in the same article or on the same paint palate!
2) The painter is interested in the colours red or blue. The paint palate may have both colours on it or just red or blue
3) The painter is interested in the colour red but not blue. The paint palate will have only the colour red on it

However, though it seems straightforward incorrect usage of Boolean is one of the most common errors found in Systematic Review searches.

AND

Red AND Blue are two distinct colours: If the painter was only interested in a palate that contained both Red and Blue, the Boolean AND, has been used correctly. In this case, AND narrows the options.

However, errors can occur when multiple concepts are combined incorrectly. For example, the painter may think "I'm interested in Blue AND Red AND Scarlet AND Ruby".

Blue	AND	Red	AND	Scarlet	AND	Ruby

It is human nature to mentally use the word AND to gather your terms in your mind. However, databases interpret AND literally and their computer logic determines that

all terms joined by AND must be present. – So in this example, computer logic determines that Blue AND Red AND Scarlet AND Ruby should be on the same palate, yet what the painter really wanted was Blue and was prepared to take any of the variants of the red colour. In other words;

Blue	AND	Red	OR	Scarlet	OR	Ruby

OR

Essentially OR is used to gather concepts with very similar meanings.

OR groups alternative or flexible words together.

OR broadens the search.

If there are any discrepancies in definition, those with discrepancies should be searched separately otherwise the results could become contaminated by a flawed concept.

For example:

Red	OR	Scarlet	OR	Ruby	OR	Blue

In the example above, the common concept is colour. However it would be unwise to batch Blue with the other three terms because though it is still a colour, it is a very different to Red, Scarlet and Ruby. If Blue was left in this grouping, there would be little way of knowing how many of the overall total of results specifically related to Blue. If blue was important, then it should be searched separately

NOT

NOT is often overlooked as a useful tool that can help reduce or eradicate certain terms. On some database platforms such as Ovid, the NOT command is not always

very obvious. (In Ovid you will find it on the multi-field search page) however, in most cases NOT can be manually typed between two terms to separate them.

Red	OR	Scarlet	OR	Ruby	NOT	Pink

Examples of Errors

The following examples have been taken from various systematic review searches. The first two examples are fairly simple searches but the third example highlights how the more terms you incorporate the higher the likelihood of errors;

Example 1 – mixed concepts

orthodontic OR malocclusion

orthodontic is generally the procedure to correct the malocclusion – i.e. the problem/scenario. Usually orthodontic (descriptor word) would be joined with malocclusion (condition) by an AND. You should try and keep descriptor words together and causal words together then combine with AND

Example 2 – large range of mixed concepts

schizophrenia OR decision support techniques OR empower OR self-determination

None of these four concepts necessarily have anything in common. The first is an illness whereas the other three are descriptors. In this case AND should have been used between Schizophrenia and the other descriptor words

Example 3 – mixing specific concepts with general concepts

The example below is similar to the second example. However, by including more terms in a search box, the higher the chances of errors – including typing errors;

checklist/ or geriatric assessment/ or interview/ or interview, psychological or mass screening/ or nursing assessment/ or "outcome and process assessment (health

care)"/ or personality assessment/ or psychiatric status rating scales/ or psychological tests/ or questioonaires/

In the above example general concepts e.g. checklist – are combined with specific ones such as geriatric assessment (specific age group), nursing assessment (specific discipline) and Psychiatric status rating scales (a method)

OR will not connect these together as a common theme – Checklist may refer to any environment and nursing assessment may be talking about the A&E department and have nothing to do with Psychiatry etc..

Example 4 – Large terms swamp smaller ones

Outcome assessment OR measure OR questionnaire OR "quality of life"

"Quality of life" is one of the biggest search terms in any database and usually amasses thousands of hits all by itself. If you use any terms that are known to generate huge totals, they should always be searched separately otherwise they will swamp smaller terms within that same grouping. In the case above in addition to there being some slight conflicts of definition between measure and questionnaire the boolean AND should have been used before "Quality of Life"

Example 5 – started well – but then made one (or two) errors!

schizophrenia/ or psychosis/ or (psychotic or schizo$ or psychos$ or psychoses) or ((chronic$ or sever$) adj5 mental$ adj5 (ill$ or disorder$)) or therapy/ or sociotherapy/ or exp clinical study/

All the illnesses were grouped together and all the therapies were grouped together but these two batches should then have been separated by AND

Also because a truncation sign was used – the keyword, psychoses, was not needed because this would have been picked up by psychos$

CEH – 3 April 2014