Searching with Boolean Logic & Operators

The principle of Boolean logic, which uses words called Boolean operators, lets you organize concepts together in sets or groups. When searching in computer databases, these sets are controlled by you, the searcher, using the words: **OR**, **AND**, and **NOT**.

How do they work? Think about ice cream. Imagine all the possibilities a soft ice-cream machine could make if it offered chocolate, strawberry, and vanilla, and could mix together any and all combinations of those flavors. There are seven possible combinations of ice cream flavors available: each flavor by itself, three combinations of two flavors in a swirl, plus all three flavors mixed together.   Yum! Yum!
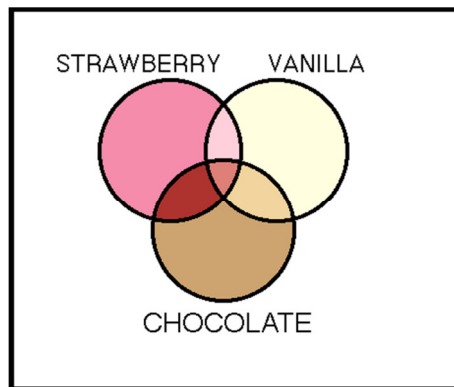
Combining your search terms with OR

In Boolean logic terms, a group that included any of these flavor combinations would be expressed as:

strawberry OR vanilla OR chocolate

The representative diagram, called a Venn diagram, for this combination would look like this:

In database searching **OR** expands a search by broadening the group. It is often used to combine synonyms or like concepts. If you were interested in searching an online database for information about teenagers, to be more comprehensive you might use the group:

adolescents OR adolescence OR teens OR teenagers OR young adults

This search statement would retrieve records that mention any of those terms. Think of **OR** as meaning **either or**. The **OR** operator, however, doesn't have to group together only synonyms. You could also search a database for **infants OR children OR adolescents**.

Combining your search terms with AND

Back to ice cream. If you don't wish to try every possible flavor combination the soft ice cream machine offers all at once, you should narrow your selection. You might want to choose an individual flavor or one combination of flavors. To order a swirl of all three flavors combined, chocolate, vanilla, and strawberry, all must be included.

In terms of Boolean logic, a group that includes all of three elements would be expressed as:

strawberry AND vanilla AND chocolate

The Venn diagram for this combination would look like this:
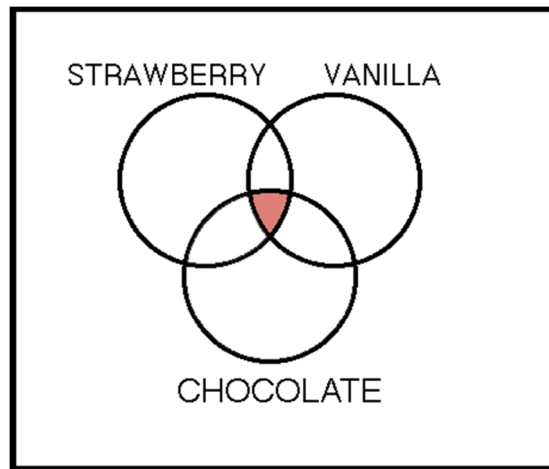
In database searching **AND** narrows a search. It is often used for linking together different concepts. Searching a database with the search statement **college students AND behavior** would retrieve records only if both the phrase "college students" and the word "behavior" appear in them. Think of **AND** as **only if also**.

Please remember that the database is not doing any thinking, nor does it understand any concepts; it is only matching words and phrases. A record for an item that is principally about the economic status or religious beliefs of college students would be retrieved if the word "behavior" appears somewhere in the record, but an item about college students and drug use or alcohol abuse would not, unless the term "behavior" is included in the searchable part of the record.
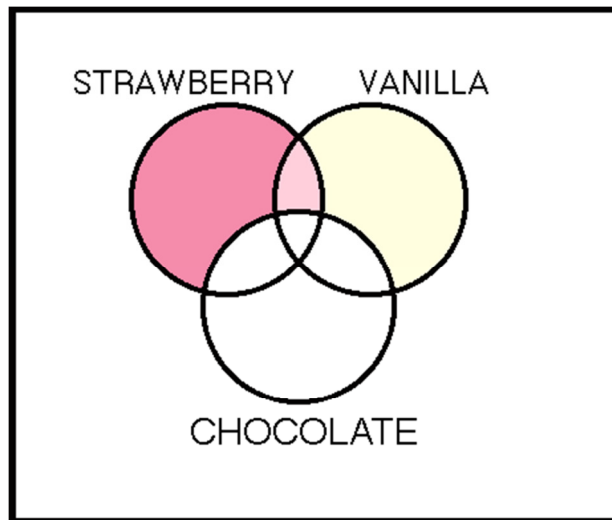
Using NOT

Back to more ice cream. You may hate chocolate. I know it may be hard to do, but pretend you hate chocolate. Perhaps you have already eaten three brownies and don't want any more chocolate. When you order ice cream, if you do NOT want chocolate, that would leave you with only three possibilities, strawberry by itself, vanilla by itself, or a swirl of strawberry and vanilla. In other words, you're subtracting a concept out of it. The resulting group would be

(strawberry OR vanilla) NOT chocolate

The Venn diagram for this combination would look like this:

In database searching, **NOT** is used to get rid of an unwanted concept. If you were interested in studying college students but not high school students, you could create the group **college students NOT high school**.

Keep in mind that **NOT** should be used sparingly, perhaps not at all, since it often brings about unintended results by eliminating information that might have been relevant. Once again, remember that the database is not doing any thinking, nor does it understand any concepts; it only matches words. If you were interested in research on college students but not on research of high school students, you could add the concept **NOT high school** to your search statement. That would eliminate many records that are only about high school students, but it would also eliminate records that deal with both college students and high school students, such as this one: "**College students** are better prepared than students in boarding **high schools** to deal with the challenges of living away from home."

Combining Operators

You can combine groups or sets in a variety of ways using the different combinations of Boolean operators. When writing out the groups or sets, parentheses ( ) are important because they keep the logic straight. In the grouping **(high school students OR college students) AND (behavior OR motivation) AND (drugs OR alcohol)** the parenthesis around the first set tells the database to create a final set of records that may include either of the phrases high school students OR college students, but only when the records also include either of the words behavior OR motivation plus only if in addition either of the words drugs OR alcohol appear. Searching combining operators may take some practice to master.

Beyond Boolean (Truncation and Wild Cards)

In addition to using Boolean operators, for good searches, it may be necessary to use **truncation** and **wildcard** characters to expand or control searches.

Truncation is a searchable shortened form of a word. This means you can take short cuts. Instead of writing out **adolescents OR adolescence**, you can use the truncated term **adolescen***. Unfortunately, databases are not consistent with truncation symbols, so in one you might have to use **adolescen***, but in another **adolescen?**, and in yet another, just **adolescen** (if truncation is automatic). Many databases are smart enough to pick up regular plurals without adding truncation, such as **school** retrieving both **school** and **schools**, but not all do, and they would be even less likely to be designed so that child would retrieve both **child** and **children**, without also retrieving **childbirth, childhood**, and **childishness.**

Wild card characters are useful because of alternate spellings and other quirks in the English language. Just as British and Canadian ice cream comes in **flavours**, not **flavors**, a British or Canadian study of college students may use the term **behaviour**, instead of **behavior**. Searching with a wild card can help. With the term **behavio?r**, both **behaviour** and **behavior** may be searched together. The most common use of wild cards is because of women. **Wom*n** should pick up both **women** and **woman**. Once again, because databases are not consistent with the characters they use, as the examples indicate, you will have to use different wildcard characters in different databases. It is best to check the help screens to see the exact symbols and rules.

Using truncation and wild cards in searching may take some practice to master.