Mixing Boolean Operators in Database Environments

Many databases, in an attempt to feature the fact that searching is possible by the Boolean operators AND, OR, and NOT, provide interfaces with pull-down menu options for users to select the desired operator. Figure 1 shows an advanced search form from Business Source Complete under the EBSCOhost interface.

![Figure 1. EBSCOhost advanced search form with choice of Boolean operator.](image)

Other interfaces that also have this kind of feature include ProQuest, JSTOR, IEEE Xplore, the general Gale interface, and Readex AllSearch. Generally these features are found on the advanced search forms.

Let’s examine why these forms are sometimes a problem. Suppose a student is looking for items about snakes in Colorado and Wyoming. The logical search string here would be: snakes AND (Colorado OR Wyoming). A student would likely populate the search form as shown in figure 2.

![Figure 2. Unintended consequences from using the advanced search form in EBSCOhost.](image)
The problem here is that the search engine is processing the Boolean operators in an order that was not what the user wanted, so it’s causing unintended consequences. Let’s see what was really happening here.

- snakes AND (colorado OR wyoming) = 357 results
- (snakes AND colorado) OR wyoming = 17,779 results

From this we can see that the EBSCOhost interface was processing the terms from left to right, with the OR statement being handled last. Do all such interfaces act in this same way? The only way to know is to test it out.

**Academic OneFile (Gale)**
- Form filled out as in figure 2 = 9,306
- snakes AND (colorado OR wyoming) = 84
- (snakes AND colorado) OR wyoming = 9,306
- Comment: Patterns just like EBSCOhost.

**ProQuest Central**
- Form filled out as in figure 2 = 40,346
- snakes AND (colorado OR wyoming) = 40,346
- (snakes AND colorado) OR wyoming = 1,474,366
- Comment: Does NOT pattern like EBSCOhost, but processes OR first, then AND.

**IEEE Xplore**
- Form filled out as in figure 2 = 646
- snakes AND (colorado OR wyoming) = 646
- (snakes AND colorado) OR wyoming = 646
- Comment: Apparently IEEE is processing OR statements first, regardless of the parentheses.

So, the conclusion is that users should always keep OR statements together on a single line and avoid using the vendor-supplied pull-down menu options.