Deductive vs. Inductive Logic

Deductive Logic

Here, you start with a general rule, and you make a specific conclusion based on it.

- Example #1: All numbers that are divisible by 5 end in either a 5 or a 0. Therefore, since it ends in a 0, the number 4730160 is divisible by 5.
- Example #2: Tom is allergic to peanuts. This candy has peanuts in it. Therefore, Tom should not eat this candy.

If you can re-word the "given" in terms of **all**, and the "conclusion" in terms of **one**, then you have deductive reasoning. Using example #2, for instance, I could have re-worded it as "**All** peanuts make Tom sick. This **one** candy has peanuts in it. Therefore, this **one** candy will make Tom sick."

Of course, as with any logic, deductive reasoning only works if your initial premise (the **all**, the general rule) is correct. It is often mis-used to justify types of prejudice: **All** women are weak. Therefore this **one** woman, Beth, should not be allowed to be a firefighter. Faulty premise; faulty conclusion--but 'good' logic.

Inductive Logic

Here, you start with several specifics, and use them to justify making a general statement.

- Example #3: On Monday, the sun came up in the morning. On Tuesday, the sun came up in the morning. On Wednesday, the sun came up in the morning. Therefore, the sun must come up every morning.
- Example #4: The graph of y=2x+7 crosses the y-axis at 7. The graph of y=-4x+1 crosses the y-axis at 1. The graph of y=9x-2 crosses the y-axis at -2. The graph of y=3x+17 crosses the y-axis at 17. Therefore, the graph of y=mx+bmust cross the y-axis at the number represented by b.

If you can re-word the "given" in terms of "one," and the conclusion in terms of "all," you have inductive reasoning. Do you remember the Three Musketeers? They said, "All for one, and one for all!" That, in alphabetical order, is how I made myself remember the difference between deductive ("All for one") and inductive ("one for all!") logic.

Again, however, inductive logic is only as good as the limited specific data allows it to be. And inductive logic often serves as the basis for the general statements that are used incorrectly to justify the prejudice I mentioned above. For example: Mary can't lift 150 pounds. Anna can't lift 150 pounds. Linda can't lift 150 pounds. Jennifer can't lift 150 pounds. Therefore, all women are unable to lift 150 pounds--[so, as I 'proved' before, Beth can't be a firefighter. It doesn't matter that Beth can indeed lift 150 pounds.].

In summary:

Deductive reasoning goes from <u>all</u> (a general rule) to <u>one</u> (a specific case). **Inductive reasoning** goes from <u>one</u> (a bunch of single data) to <u>all</u>(a general conclusion).