Arranging conditionals in a logical chain

In this lesson we'll look at how to use conditionals to write a logic chain of statements.

We already know that a conditional statement is an if/then statement where the first part is the hypothesis and the second part is the conclusion, like this:

"If A, then B."

Logic chains (with conditionals)

A logic chain is something we make by stacking linked conditional statements back-to-back. Here's a logic chain with three conditional statements:

If A, then B.

If B, then C.

If C, then D.

Notice that the conclusion of the first statement, B, is also the hypothesis of the second statement, and that the conclusion of the second statement, C, is also the hypothesis of the third statement. This pattern would be continued if the chain had more than three conditional statements.

If events are listed in a logical chain like this, then you can conclude the following:

If A is true, then C is also true (through B), and

If A is true, then D is also true (through B and C).

Therefore, given a logic chain of conditionals, you can form another conditional (which we'll call the **logical conclusion**) by using the hypothesis of the first conditional in the chain as its hypothesis, and using the conclusion of the last conditional in the chain as its conclusion.

Given the logic chain of three conditionals above (if A, then B; if B, then C; and if C, then D), the logical conclusion is the conditional statement "If A, then D."

Let's look at an example.

Example

What is the missing conditional statement in the three-step logic chain shown here?

1) If juice gets spilled on the table, then it will get sticky.

2)

3) If the ants come, then we will need an exterminator.

Let's think about what creates this pattern:

If A, then B.

If B, then C.

If C, then D.

We can fill this in with what we know.

If **juice gets spilled on the table**, then **it will get sticky**.

If B,   then C.

If **the ants come**,   then **we'll need an exterminator**.

The hypothesis of the second conditional, B, must be the same as the conclusion of the first conditional (the table getting sticky), and the conclusion of the second conditional, C, must be the same as the hypothesis of the third conditional (the ants coming), so we can now form the second, missing conditional:

If the table is sticky, then the ants will come.

And then we can see the whole logic chain:

If **juice gets spilled on the table**, then **it will get sticky**.

If **the table is sticky**,   then **the ants will come**.

If **the ants come**,   then **we'll need an exterminator**.

Let's look at another example.

Example

What is the logical conclusion of the logic chain?

> 1) If I clean my house, then I will invite over some company.

> 2) If I invite over some company, then I will cook dinner.

> 3) If I cook dinner, then my kitchen will be dirty.

The parts of this logic chain appear in the following order:

> from "If I clean my house"

> to "I will invite over some company"

> to "I will cook dinner"

> to "My kitchen will be dirty."

To come up with the logical conclusion of this logic chain, we use the first part (cleaning my house) as its hypothesis, and the last part (my kitchen being dirty) as its conclusion.

> "If I clean my house, then my kitchen will be dirty."