Chapter 1, Lecture 1

Formal and Informal Logic: An Introduction

Logic is the study of good reasoning. This is our definition, so we'll put it in a box, like so:

**Logic** is the study of good reasoning.

But this is a *huge* subject. So, let's get a grip by dividing up our subject matter.

**Formal and Informal Logic**

We'll be thinking about *giving reasons* or evidence for some claim we'd like to support or prove. That's logic... such reasoning is called an **argument**.

An **argument** is a collection of statements including some (the **premises**) that are given as reasons for another (a **conclusion**).

Let's begin with **formal logic** and arguments that can easily be formalized. Here's an easy example.

Chris will get an "A" or a "B" in logic class.
Chris (it turns out) does not get an "A".
*So,* Chris will get a "B".

Notice that this reasoning works. And it would work just as well if we were reasoning about someone else's logic grade. AND it could work if we had another argument in mind with the same "form".

**Here's a way to see the form:**

Either A or B.
It's not the case that A.
*Thus, B* is true.

The point of all that is that logic is the logic of language. Good formal reasoning will need to have the right structure. That is to say: a good formal argument has it's sentences *put together in the right way*.

**Formal or Deductive Logic**: the study of good *form* in reasoning.

As the tutorial describes…

**Formal reasoning manipulates** the statements of evidence and performs something of a calculation on them in virtue of their form or sentential structure.
We will work on the form of arguments in many different ways. As the name implies, argument forms are of greatest importance in formal logic. The “calculation” or “deduction” of the conclusion involves formal manipulations following set rules…not so different from adding $68 + 57$ (for example) following the rules that manipulate ‘7’ and ‘8’ to get ‘15’, carrying, and finally adding ‘6’, ‘5’ and ‘1’.

But numbers aren’t needed for such a formal manipulation…

Chris will get an "A" or a "B" in logic class.
Chris (it turns out) does not get an "A".
So, Chris will get a "B".

…we can calculate, or better "deduce" the conclusion that Chris will get a 'B' by one-step process of elimination rule DS. That’s why formal logic is also called deductive logic. (As we’ll see, the computer doesn’t know anything about the meaning of “or” or “process of elimination” thinking…it just makes the deduction.

But there is also

**Informal or Inductive Logic: the study of good form in reasoning.**

But even informal or inductive logic is partly based on forms (each inductive argument needs to have premises leading to a conclusion…that much form at least!) But, as the Chris-is-in-love example shows, this sort of reasoning depends also on content…what we know about how Chris behaves (suddenly happy all the time, no longer complaining, no weeknights at the bars until the wee hours…)

**Informal reasoning** interprets the evidence to form a conclusion. This thinking amplifies the evidence -- often by generalizing, predicting, or uncovering the best explanation or interpretation of this evidence.

(Think about figuring out that Chris is in love. This may be a "best guess" but it may be a reasonable one. We conclude that Chris is in love because love is the best explanation or interpretation of Chris’s behavior.)

**Named Deductive Forms**

The process of elimination argument form we've been seeing will henceforth be called DS:

Chris will get an "A" or a "B" in logic class.
Chris (it turns out) does not get an "A".
So, Chris will get a "B".

That is to say:
Any argument with the form: "Either A or B, but not-A, so B" is called **DS** or "disjunctive syllogism".

Here’s another:

> If Chris gets an A, then he will be very happy. And (as it turns out) he *does* get an 'A'. So, it follows that Chris will be very happy.

This is an argument of a form we'll name as follows.

Any argument of the form "If A then B, and A so B" is called **MP** or "Modus Ponens".

> If Chris gets an A, then he'll be very happy. But he turns out to be unhappy. So, it follows that Chris did *not* get an 'A'.

This is a different form:

Any argument of the form "If A then B, but not-B, so not-A" is called **MT** or "Modus Tolens".

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**Sentences and Statements**

But there is one more point about the *language* of arguments. Look back at our definition to see.

An *argument* is a collection of *statements* including some (the *premises*) that are given as reasons for another (a *conclusion*).

The definition doesn't say "sentences"; it says "statements". What is the difference? Statements are just one type of sentence, a sentence that makes a statement...i.e., says what is true.

1. Do you like tea?  
2. I like tea.  
3. Tea...Yum!  
4. Drink your tea.  

} three are NON-statements…which three?
Only sentence 2. makes a statement: because it states what may be true. It's a statement about a preference. But it's a statement nonetheless!

Now, the important point is that a sentence can be...

- a question
- an exclamation
- a command, or
- a statement

But only sentences of the latter sort, those that *make a statement*, can be a part of an argument.

Arguments are made up of statements because these are the only type of sentence that can be *true or false.*