Introduction to Logical Reasoning

Lecture #2

Statements

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What is a Statement?

Statements are the building blocks of an argument.

Statement: An assertion that something is or is not the case; a statement is always either true or false.

Keep in mind that this does not imply that you or I correctly *know* whether a statement is true or false.

For this class, I will use "statement" (Vaughn) and "proposition" (Copi and Cohen) interchangeably.

Types of Statements

Simple statement: A statement that involves *only one* individual claim or assertion.

Compound statement: A statement that involves *more than one* claim or assertion. A compound statement may therefore be understood as being composed of multiple simple statements.

Simple Statements

Positive (affirmative) statement: A simple statement asserting that something is *true*.

Logic is a fun class.

Negative statement: A simple statement asserting that something is *false*.

Logic is **not** an easy class.

Compound Statements

Conjunctive statement: A compound statement asserting the truth of *all* its statements.

> Logic is fun **and** logic is hard.

Such a statement is false if *any one* of its statements is false. We call the statements contained within a conjunctive statement the **conjuncts**.

Compound Statements

Notice there are a lot of *other* ways to express the *exact same logic* within a conjunctive statement:

Logic is fun **and** hard.

Logic is **both** fun **and** hard.

Logic is fun, **also** it is hard.

Logic is fun **but** hard.

Logic is fun, **yet** it is hard.

Logic is fun, **though** it is hard.

} These certainly have different *connotations*, but they all have the same *logical* content.

Compound Statements

Disjunctive statement: A compound statement asserting the truth of *at least one* of its statements.

Logic is fun **or** logic is hard.

Such a statement is false if *every one* of its statements is false. We call the statements contained within a disjunctive statement the **disjuncts**.

Compound Statements

Notice there are a lot of *other* ways to express the *exact same logic* within a disjunctive statement:

Logic is fun **or** hard.

Logic is **either** fun **or** hard.

Logic is fun **unless** it is hard.

As before, these may have different connotations, but they are all logically identical.

Compound Statements

Hypothetical statement: A compound statement of the form "if… then …".

> **If** you take an aspirin, **then** your headache will go away.
>
> **If** you arrive after I have called your name, **then** you will be marked as tardy.

How would you show that a hypothetical statement, like either one of the above, is false?

Compound Statements

A hypothetical statement asserts that there is a special relationship between the *if* statement (called the **antecedent**) and the *then* statement (called the **consequent**). It claims that whenever the antecedent holds, then the consequent *must* hold as well.

So the truth or falsity of a hypothetical is just the truth or falsity of this relationship, and it is *only* false when the antecedent (the "if" part) is true while the consequent (the "then" part) is false.

Remember this—it will become *very* important later on in the course!

Compound Statement Indicator Words

Common Conjunctive Indicators

and	but	while
both . . . and . . .	yet	however
also	though	furthermore

Common Disjunctive Indicators

or	either . . . or . . .	unless

Common Hypothetical Indicators

if . . . then . . .

Analyzing Statements

Now we can start looking at statements to break down their logical form concerning the assertions and claims they make.

Statement 1

Consider the following statement:

I will not study logic tonight.

What is its logical structure?

Statement 2

Consider the following statement:

> If I study logic tonight, then I will not go to the mall.

What is its logical structure?

Statement 3

Consider the following statement:

> I will not study logic tonight, but I will take a nap.

What is its logical structure?

Analyzing Statements

However, our goal is to dig even deeper in the analysis of statements. For instance, consider the following:

> If I stay home and I study logic, then I will either get a good grade in class or be grumpy.

There is a lot going on here! Overall it is a compound hypothetical ("if … then …"), but the antecedent is a compound conjunctive ("and") while the consequent is a compound disjunctive ("either … or …").

Next Class...

We will hold our first weekly workshop of the semester, practicing this form of statement analysis. Please do look over the problem set, so you can start practicing before then.

Ideally, you should come to the workshop prepared to ask either your workshop partners, Sophie, Valerie, Zack, Muna, Ralph, or me for help.

Remember this week's extra credit: come to my office and introduce yourself to me! Also, please do not forget to turn in your response to the Lecture #2 Questionnaire on your way out.