

# Reason and Argument

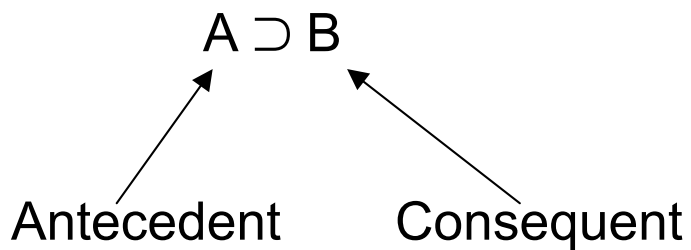
## Lecture 6:

## Conditionals

# Logical Conditional

For the logical conditional we use “ $\supset$ ”  
(horseshoe).

A conditional has an **antecedent** and a  
**consequent**.



# Logical Conditional

The logical conditional is also known as  
**“the material conditional”**

Truth Table definition:

<b>A</b>	<b>B</b>	<b><math>A \supset B</math></b>
T	T	T
T	F	F
F	T	T
F	F	T

A logical conditional is false if its antecedent is true and its consequent false; otherwise, it's true.

# Valid Argument Forms with “ $\supset$ ”

<b>A</b>	<b>B</b>	<b><math>A \supset B</math></b>
T	T	T
T	F	F
F	T	T
F	F	T

$A \supset B$

A

\_\_\_\_\_

B

$A \supset B$

$\sim B$

\_\_\_\_\_

$\sim A$

The truth of “ $A \supset B$ ” rules out it being the case that A and not B.

This looks like “If... then...” in English.

“If... then...”

If Tom is happy, then Tom is smiling

Tom is happy

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Tom is smiling

If Tom is happy, then Tom is smiling

It's not the case that Tom is smiling

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It's not the case that Tom is happy

## Indicative “If... then...”

For the moment, we’ll concentrate on indicative conditionals in English...

Roughly, “If... then...” sentences in which the blanks are filled with whole indicative sentences.

Example:

“If John’s not in the kitchen, then he’s in the loft.”

“If John’s not in the kitchen, then John’s in the loft.”

Is the Logic of Indicative “If...  
then...” captured by “ $\supset$ ”?

A	B	If A, then B
T	T	
T	F	F
F	T	
F	F	

The filled row looks fine, but what about the others?

The material conditional is **truth-functional**—  
and, for example, *any* two true sentences  
plugged in to “ $\supset$ ” produce a true sentence.

“Some dogs bark  $\supset$  York has a university”  
is true.

# “Entails”

If an argument

A, therefore B

is deductively valid, we say that A **entails** B



## “If... then...” and “ $\supset$ ”

‘ $A \supset B$ ’ is true whenever A is false or B is true,  
e.g. ‘Penguins fly  $\supset$  Grass is green’ is true.

Many people think ‘If penguins fly, then grass is green’ is false...

They think that the indicative conditional in English is **stronger** than the material conditional: they think there’s *more* to the truth of “If A then B” than “ $A \supset B$ ”.

Putting it another way:

They think that it takes more to make

If A then B

true than it does to make

$A \supset B$

true.

# “If ... then ...” and “ $\supset$ ”, continued

Those who hold that ‘If  $\alpha$  then  $\beta$ ’ is *stronger* than ‘ $\alpha \supset \beta$ ’ think ...

that although ‘If  $\alpha$  then  $\beta$ ’ *entails* ‘ $\alpha \supset \beta$ ’...

(that if ‘If  $\alpha$  then  $\beta$ ’ is true, ‘ $\alpha \supset \beta$ ’ must be true too)

... it is not the case that ‘ $\alpha \supset \beta$ ’ entails ‘If  $\alpha$  then  $\beta$ ’

(that ‘ $\alpha \supset \beta$ ’ can be true without ‘If  $\alpha$  then  $\beta$ ’ being true)

# An Argument

Here's an argument to show that "If A, then B" is logically equivalent to " $A \supset B$ ". First, consider

Either the butler did it, or the gardener did it.  
Therefore, if the butler didn't do it, the gardener did.

This argument is *formally* valid.

Notice that the premise is:  $B \vee G$ .

Now,  $B \vee G$  is logically equivalent to  $\sim B \supset G$ , so

$$\sim B \supset G$$

Therefore, If not-B, then G

This is formally valid.

So, " $A \supset B$ " *does* entail "If A, then B"

" $A \supset B$ " is *not* weaker than "If A, then B"

**B v G is logically equivalent to**

**$\sim B \supset G$**

<b>B</b>	<b>G</b>		<b>B</b>	<b>v</b>	<b>G</b>		<b>~</b>	<b>B</b>	<b>⊃</b>	<b>G</b>
T	T		T	T	T					
T	F		T	T	F					
F	T		F	T	T					
F	F		F	F	F					

# Intuitions about “If... then...”

Question:

If indicative conditionals are just material conditionals, why do we *feel* they are not?

Proposed Answer:

(Roughly) Because the puzzling examples are *very odd things to say* (rather than being false)

We mistake “*You shouldn’t say that*”  
for “*That’s false*”

# Conditionals and Implicatures, (1)

Assume “If... then...” is equivalent to “ $\supset$ ”.

If someone said

“If Costa Rica has an army, then Barry is a lecturer.”

on the basis of knowing that “Costa Rica has an army” is false, *or* of knowing that “Barry is a lecturer” is true, *or* both, that would be *odd*.

It'd be odd because it doesn't *rule out* “Costa Rica has an army” being true, nor does it rule out “Barry is a lecturer” being false.

So, someone who said it on one of these bases would *understate* her views.

She'd break a *rule of conversation*.

## Conditionals and Implicatures, (2)

In many cases in which a speaker utters an indicative conditional “If A, then B”, she *suggests*

- (a) that she knows no more about the truth values of “A” and “B” than that not both A and not B;
- (b) that she knows of some connection between the subject matters of “A” and “B” which would rule out: it being true that A without it being true that B.

Notice that these things are merely *suggested* by her uttering the sentence she does.

This makes

“If penguins fly, then grass is green”

a weird thing to say, without making it *false*.

# Indicative and Subjunctive Conditionals

So far, we've concentrated on indicative conditionals

—roughly, conditionals that have the form “If A, then B”, where “A” and “B” are expressions that could stand as indicative sentences on their own.

e.g. “If Oswald didn't kill JFK, then someone else did”

We've argued these are truth-functional.

There is at least one other form of conditional:

## **Subjunctive Conditionals.**

e.g. “If Oswald hadn't killed JFK, then someone else would have”



# Subjunctive Conditionals

Typically, subjunctives have clauses that can't stand as independent indicative sentences:

“If Oswald hadn't killed JFK, then someone other than Oswald would have”

Subjunctives are *not* truth-functional.

- (i) “Oswald hadn't killed JFK” isn't a sentence and isn't up for being true or false.
- (ii) The subjunctive can be true *or* false with the indicative held true.

# More Subjunctives

“If I had slept in today, Tom would have been incandescent with rage.”

“Had I slept in today, Tom would have been very annoyed.”

“Were I to have slept in today, Tom would have been piqued.”

It's arguable that one (more) reason we prone to think indicatives aren't material conditionals is that, in modern English, we often *mean* a subjunctive but say something grammatically indicative.

“If someone annoys me, I'll set a hard exam”

“If someone were to annoy me, I would set a hard exam”

# Summary

Logical conditionals are of the form  $A \supset B$ .

A logical conditional,  $A \supset B$ , is truth-functional. It is false where  $A$  is true and  $B$  is false, and true otherwise.

Valid forms of inference:

$A \supset B, A$ ; therefore  $B$

$A \supset B, \sim B$ ; therefore  $\sim A$

If  $A$ , then  $B$ ,  $A$ ; therefore  $B$

If  $A$ , then  $B$ , not  $B$ ; therefore not  $A$

Hypothesis: Where 'If  $A$ , then  $B$ ' is an *indicative* conditional, it is equivalent to ' $A \supset B$ '

# Summary

**Problem:** 'A  $\supset$  B' is true in any case in which A is false or B is true. This seems to clash with our intuitions ...

E.g. 'Some dogs bark  $\supset$  York has a university' is determined true by the facts and the definition of ' $\supset$ '.

Many people think 'If some dogs bark, then York has a university' is false.

But ...

(a) There is an argument that indicative 'If A, then B' and 'A  $\supset$  B' are logically equivalent

(b) Our resistance to accepting that 'If A, then B' as true in the problem cases can, it seems, be explained in terms of rules of conversation.

# Summary, continued some more ...

Don't confuse indicative conditionals, like

If A, then B

with subjunctive conditionals, like

Had it been that A,  
then it would have been that B

Subjunctive conditionals are *not* truth-functional.