PH133 Logic Lecture 5

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Truth table for →

Assuming that the rules of Fitch are such that it is impossible to prove an argument which is not logically valid, the truth-table for \rightarrow is fixed if we accept \rightarrow Elim and \rightarrow Intro.

How do the rules of proof for \rightarrow fix its truth table?

Α	В	$A \rightarrow B$
Т	Т	
Т	F	
F	Т	
F	F	

'If' and '→' do not match

_ ¬A	Marnie will not miss her train
$A \rightarrow B$	If Marnie misses her train, she will arrive on time.

'If' and '→' do match

-	- ¬A∨B If A, B	America does not exist \vee Baudrillard is wrong If America exists, Baudrillard is wrong
ı	_ If A, B	If you love logic, things will fall into place
	(A ∧ ¬B)	If you love logic, things will fall into place Not both: you take logic and things don't fall into place

Quantifiers

Everything is broken: ∀x Broken(x) Something is broken: ∃x Broken(x)

What does \exists mean? We give the meaning of \exists by specifying what it takes for a sentence containing \exists to be true:

- 1. Give every object a name.
- 2. For each name in turn, create a new sentence like this: delete the quantifier and replace all instances of the variable it binds with that name
- 3. If ANY of the new sentences are true, so is the original.

Translations

Some persuasive and useful arguments are not valid.

$$\exists x (Persuasive(x) \land Useful(x) \land Argument(x) \land \neg Valid(x))$$

All discordians weep.

$$\forall x (Dscrdn(x) \rightarrow Wps(x))$$

All French discordians weep.

$$\forall x ((Frnch(x) \land Dscrdn(x)) \rightarrow Wps(x))$$

All French discordians weep and wail.

$$\forall x ((Frnch(x) \land Dscrdn(x)) \rightarrow (Wps(x) \land Wls(x)))$$

All French discordians weep and wail except Gillian Deleude.

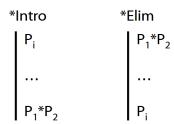
$$\forall x ((Frnch(x) \land Dscrdn(x) \land \neg x=a) \rightarrow (Wps(x) \land Wls(x)))$$

Fubar rules*

Q1. What would be wrong with adding ∧Fubar to Fitch?

Q2. What would be wrong with having AFubar in any system of proof?

Tonk



[*I made up the Fubar rules. You don't need to know them, and you won't find them in the textbook. They're only there as an illustration.]