Logic I: Lecture 1

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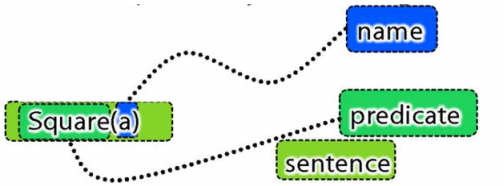
Readings refer to sections of the course textbook, *Language, Proof and Logic*.

1. Quick Intro to FOL

Reading: §1.1, §1.2, §1.3



A formal langauge enables us to avoid ambiguity, e.g.:

> This is a hospital where doctors are trained.

A formal langauge also enables us to some avoid appearance–reality problems:

> Many more people have been to Paris than I have.

2. Logically Valid Arguments

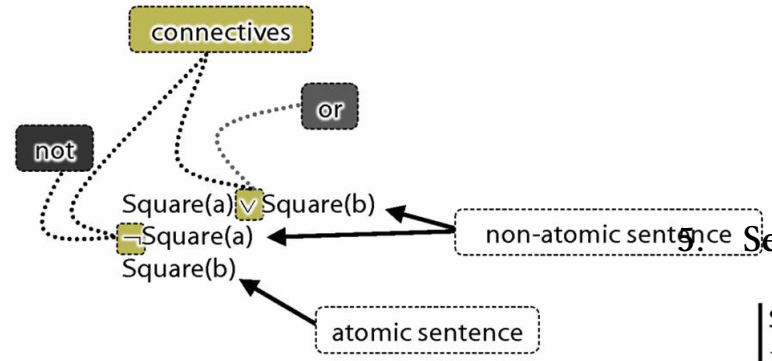
Reading: §2.1

An argument is *logically valid* just if there's no possible situation in which the premises are true and the conclusion false

A *connective* joins one or more sentences to make a new sentence. E.g. 'because', '¬'. The sentences joined by a connective are called *constituent sentences*.

E.g. in 'P ∨ Q',

> ∨ is the connective
>
> P, Q are the constituent sentences



3. Counterexamples

Reading: §2.5

A *counterexample* to an argument is a possible situation in which its premises are T and its conclusion F.

There are no counterexamples to a logically valid argument.

If an argument is not valid, then there is a counterexample to it.

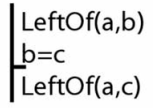
To show that an argument is not logically valid, we specify a counterexample to it.

4. Identity

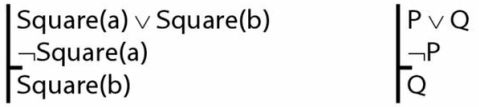
Reading: §2.2

Principle: If b=c then whatever is true of b is also true of c.

Principle: a=a is never false



5. Sentence Letters



6. Truth Tables

Reading: §3.1, §3.2, §3.3

Rough guide:

‘$\wedge$’ means and

‘$\vee$’ means or

‘$\neg$’ means not

A	B	A $\vee$ B	A $\wedge$ B
T	T	T	T
T	F	T	F
F	T	T	F
F	F	F	F

A	$\neg$A
T	F
F	T

7. Complex Truth Tables

P	Q	$\neg$(P $\wedge$ Q)
T	T	
T	F	
F	T	
F	F	