Class 2

Discussion Time!

What did we discuss in our previous class?

Not

used to express the negative of other words

(Oxford Dictionary of English)

Negative

Consisting in or characterized by the absence rather than the presence of distinguishing features

(Oxford Dictionary of English)

Absent

Not present in a place, at an occasion, or as part of something

(Oxford Dictionary of English)

In our previous class

1. Paraphrasing (dictionary) approach is **NOT** helpful when you define a meaning.

2. It was **Greek logicians** that started analyzing meaning in a way completely different from the paraphrasing approach.

3. But how?

Discussion Time!

Greek philosophers (logicians) succeeded in analyzing the meaning of 'not' without paraphrasing.

Do you have any idea how they did it?

Logic:
Under what conditions do we have a logical inference?

What logicians want to capture:

The following inference (logic) is wrong!

Premise: Tomorrow is Sunday.

(Therefore)

Conclusion: Tomorrow is not Sunday.

But this inference is right:

Premise: Tomorrow is Sunday.

(Therefore)

Conclusion: It is not the case that tomorrow is not Sunday.

The **truth value** is the state of a proposition.

- It takes **True**, when the sentence is judged correct.
- It takes **False**, when it is judged wrong.

Example

In most cases, it depends on the world we are in:

It is snowing now.

→ **True** when

→ **False** when

Logicians define the meaning of ‘**not**,’ based on the **truth value** of a proposition.

Some minor setup

It is **not** snowing now.

= [**It is not the case that** [it is snowing now]].

= [**Not** [p it is snowing now]].

= $\neg$ **P**

The truth value of this proposition is either T or F!

Meaning of ‘not’

= Truth value transformation

P	$\neg$P
T	→
F	→

Logic:
Under what conditions do we have a logical inference?

What logicians want to capture:

The following inference (logic) is wrong!

Premise: Tomorrow is Sunday.

(Therefore)

Conclusion: Tomorrow is not Sunday.

But this inference is right:

Premise: Tomorrow is Sunday.

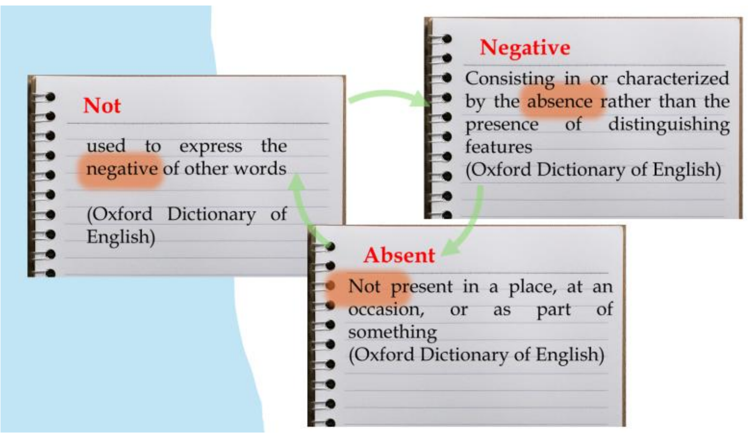
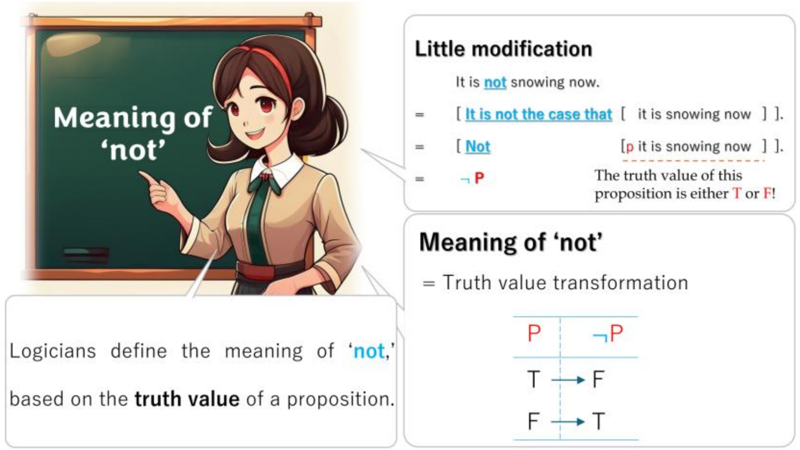
(Therefore)

Conclusion: It is not the case that tomorrow is not Sunday.

Truth table-analysis

P	¬P	¬¬P
T →	F →	T
F →	T →	F

Interim Summary

	Paraphrasing approach	Propositional Logic
		

	Paraphrasing approach	Propositional Logic
Meaning is defined by...	other words.	truth table.
Problem of circularity	Problem	No longer a problem

Other operators

Greek Logicians analyzed

[four logical operators](#):

(words relevant in building a logic)

Some minor setup

It is snowing **and (but)** it is cold.

= [[p It is snowing] **and (but)** [Q it is cold]] .

= **P ∧ Q**

Logicians define the meaning of '**and**' by the **truth values** of propositions.

Meaning of 'and (but)'

P	Q	P ∧ Q
T	T	
T	F	
F	T	
F	F	

Discussion Time!

Let us consider the truth table for "**and**"!

Some minor setup

It is snowing **and (but)** it is cold.

= [[p It is snowing] **and (but)** [Q it is cold]] .

= **P ∧ Q**

Logicians define the meaning of ‘**and**’ by the **truth values** of propositions.

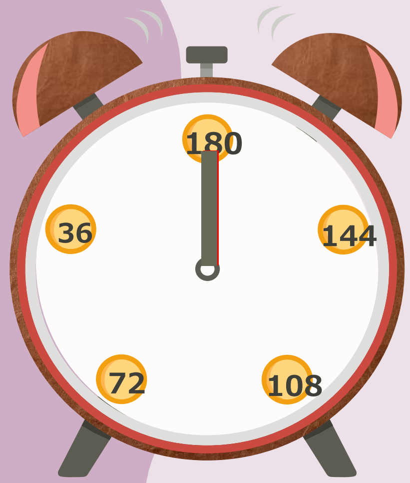
Meaning of ‘and (but)’

P	Q	P ∧ Q
T	**T**	**T**
T	F	F
F	**T**	F
F	F	F

QUIZ

P	Q	P ∧ Q
T	**T**	**T**
T	F	F
F	**T**	F
F	F	F

P	¬P
T	F
F	**T**



When P and Q are both True, which formula is TRUE?

A. $\neg (P \wedge Q)$

B. $(\neg P) \wedge (\neg Q)$

C. $\neg(P \wedge (\neg Q))$

D. $\mathrm{P} \wedge \neg P$

Logic:
Under what conditions do we have a logical inference?

Must the meaning be eventually reduced

to a digital, true/false transformation

(like the computation in a computer) ?

For logicians, the argument so far is super successful
(despite some apparent limitations),
because their goal is not so much to examine meanings, as
to investigate logical inference.

Logic:
Under what conditions do we have a logical inference?

This is just the beginning of the study of meaning.

Remember that meaning is hard to study.

Logicians discovered a good way to objectively approach meaning.

Logic:
Under what conditions do we have a logical inference?

Semantists reshaped the discussion and invented advanced analyses flexible enough to examine many more phenomena than treated in logic.

Discussion Time!

Let us consider the truth table for "**or**"!

Some minor setup

It is snowing **or** it is raining.

= [[p It is snowing] **or** [Q it is raining]] .

= **P ∨ Q**

Logicians define the meaning of ‘**or**’ by the **truth values** of propositions.

Meaning of ‘or’

P	Q	P ∨ Q
T	**T**	**T**
T	F	**T**
F	**T**	**T**
F	F	F