25 Feb 2025 - Language and Logic - Week 03

Some background concepts - Propositions

→ Sentence meanings in natural languages are termed propositions

→ "Rough" translations

$\neg P$

$P \wedge Q$

$P \vee Q$

$P \rightarrow Q$.

On the nature and form of conjunction

He took off his trousers (P) and he got into bed (Q)

Implicature: He took off his trousers and then (order) he got into bed.

Logical issue: commutativity $P \wedge Q = Q \wedge P$

but meaning appears different.

Human language seems to be non-commutative.

$P \wedge Q \neq Q \wedge P$

He inserted the key and the engine started.

What to do with the truth table?

- Both P and Q have to be true at once for entire statement to be true.

Introducing Order

P	then	Q	P ∧ Q
T		T	T
F		T	F
T		F	F
F		F	F

It's always the same thing at parties . . .

P and then Q $\neq$ Q and then P

Some more complications

Conjunction is applied to propositions not phrases

The sauce and the cheese are fresh →

The sauce is fresh and the cheese is fresh. ← Conjunction can be applied only here

The sauce and the cheese are a perfect marriage of two rivals.

→ Quantifiers do not preserve the structure of of preposition

Names do.

$Q(A)(B) = 1$ iff $A \cap B$

$$[NP] \wedge [NP] \not\rightarrow P \wedge Q$$
$$[VP] \wedge [VP] \not\rightarrow P \wedge Q$$
$$[AP] \wedge [AP] \not\rightarrow P \wedge Q$$

XP XP

still collapse

The probability being both inside and outside the class is 0.

preposition phrase

Can we accommodate all these conditions?

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* Disjunction — 'or'

Implicature

Disjunction
- exclusive interpretation
- inclusive interpretation

No one ate (either) rice or salad → Negation makes it inclusive

If you drink or smoke here, I'll kick you out → Conditional ⇒ likely inclusive

Exclusive interpretations

Sanjay left or he didn't

Maya is left-handed or she's right-handed → Usually, Implicature is strong

Using 'either' in sentences → exclusive interpretation is forced.

Can be enforced by linguistic devices (either, or)

or by real-world knowledge.

You have more devices for the inclusive interpretation

Exclusive interpretations arise, especially when two situations cannot hold at once.

A Quandry provides the evidence

How to derive exclusive implicature?

(i) $P \vee Q$

(ii) $\neg(P \wedge Q)$ as implicature of (i)

(iii) $P \bar{\vee} Q$ entailed by (i) and (ii)

$\therefore (P \vee Q) \wedge \neg(P \wedge Q)$ has the same truth table as $P \bar{\vee} Q$.

Order

or ≡ or else