LING2006 Semantics

Tutorial: Propositional Logic & Conversational Implicature

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Based on tutorial handouts by Dr. Zhuo Chen

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Review: propositional logic

- Negation: *not*, represented by $\neg$: $\neg p$ 'not p'

p	$\neg p$
T	F
F	T

Review: propositional logic

- Conjunction: *and*, represented by $\wedge$: $p \wedge q$ 'p and q'
- $p \wedge q$ 'p and q' is true iff when both p and q are true

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

Review: propositional logic

- Disjunction: inclusive *or*, represented by $\vee$: $p \vee q$ 'p or q'
- $p \vee q$ 'p or q' is true when between p and q, at least one of them is true

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

Review: propositional logic

- Exclusive *or*, represented by XOR: p XOR q 'either p or q, but not both'
- p XOR q 'either p or q, but not both' is true when between p and q, one and only of them is true

p	q	p XOR q
T	T	F
T	F	T
F	T	T
F	F	F

Review: propositional logic

- Material implication, represented by $\rightarrow$: $p \rightarrow q$ 'if p, (then) q'
- $p \rightarrow q$ is only false when p (the antecedent) is true and q (the consequent) is false.

p	q	$p \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

Review: propositional logic

- Biconditional operator: represented by $\leftrightarrow$: $p \leftrightarrow q$ 'p if and only if q'
- $p \leftrightarrow q$ is true just in case p and q have the same truth value.

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

Review: propositional logic

- Proof for a logic formula
  To provide a proof for a logic formula, the goal is to show that the entire logic formula is true, regardless of the truth values of constituting propositions
- That means you'll need to traverse all combinations of all propositions being true and false
- You will encounter these kinds of questions in your homework, and very probably, in your final exam

Practice

- Create a truth table to prove each of the following formulae and use one English sentence to illustrate it.

1. $\neg(p \wedge \neg p)$
2. $[(p \rightarrow q) \wedge \neg q] \rightarrow \neg p$
3. $\neg(p \vee q) \leftrightarrow (\neg p \wedge \neg q)$

Practice

- $\neg(p \wedge \neg p)$

p	$\neg p$	$p \wedge \neg p$	$\neg(p \wedge \neg p)$
T	F	F	T
F	T	F	T

- p: Today is Thursday.
- $\neg(p \wedge \neg p)$: It's not true [that today is Thursday and today is not Thursday].

Practice

- $[(p \rightarrow q) \wedge \neg q] \rightarrow \neg p$

p	q	$p \rightarrow q$	$\neg q$	$(p \rightarrow q) \wedge \neg q$	$\neg p$	$[(p \rightarrow q) \wedge \neg q] \rightarrow \neg p$
T	T	T	F	F	F	T
T	F	F	T	F	F	T
F	T	T	F	F	T	T
F	F	T	T	T	T	T

- p: Today is a public holiday. q: Classes will be cancelled.
- $[(p \rightarrow q) \wedge \neg q] \rightarrow \neg p$: If the following is true: If today is a public holiday, then classes will be cancelled, and indeed classes will not be cancelled, then the following must be true: today is not a public holiday.

Practice

- $\neg(p \vee q) \leftrightarrow (\neg p \wedge \neg q)$

p	q	$p \vee q$	$\neg(p \vee q)$	$\neg p$	$\neg q$	$\neg p \wedge \neg q$	$\neg(p \vee q) \leftrightarrow (\neg p \wedge \neg q)$
T	T	T	F	F	F	F	T
T	F	T	F	F	T	F	T
F	T	T	F	T	F	F	T
F	F	F	T	T	T	T	T

- The following is true: it is false that either it will rain tomorrow, or it will snow tomorrow, if and only if the following is true: it will not rain tomorrow, and it will not snow tomorrow.

Review questions

Please select all answers that apply

- Regarding conversational implicatures and the Maxims of Conversation,
  - A. If p is a conversational implicature of q, then whenever q is true, p must also be true.
  - B. The computation of the conversational implicature of a sentence in a particular context is not rule-governed.
  - C. The Maxims of Conversation are not always obeyed and breaking them may trigger particular conversational implicatures.
  - D. The Maxims of Conversation are always obeyed and breaking them will cause the conversation to fail.

Review questions

Please select all answers that apply

- Regarding conversational implicatures and the Maxims of Conversation,
  - A. If p is a conversational implicature of q, then whenever q is true, p must also be true.
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  - D. The Maxims of Conversation are always obeyed and breaking them will cause the conversation to fail.

Practice questions

- Consider the following conversation. Please
  (i) discuss what the most likely conversational implicature carried by Loki's reply is;
  (ii) explain how that implicature is derived by specifically referring to which maxim(s) is/are involved in triggering the implicature; and
  (iii) how this conversational implicature can be cancelled
- Hulk: Would you like to come over and watch tonight's game together?
- Loki: It's my roommate's birthday and we will go out for dinner.

Practice questions

- The most likely conversational implicature is that Loki will not be able to go to Hulk's place and watch the game, and it is triggered by the maxims of QUANTITY and RELEVANCE:
  On the one hand, the literal meaning of Loki's reply is not as informative as is required, since Hulk is expecting a yes or no answer and Loki's answer does not directly tell him that; and it also provides more informative than is required, since Hulk is not expecting to know whether it is Loki's roommate's birthday or what his dinner plan is. Therefore, it seems to violate the maxim of QUANTITY (i.e., both the two submaxims under the maxim of QUANTITY)
  On the other hand, the literal meaning of Loki's reply does not seem to be directly relevant to Hulk's request of information, as, again, Hulk did not ask about whether it is Loki's roommate's birthday or what his dinner plan is. Therefore, it also seems to violate the maxim of RELEVANCE.

Practice questions

- By assuming that Loki intends to communicate that he is obligated to eat with his roommate and does not have time to watch the game with Hulk, Hulk can interpret Loki's statement as being both appropriately informative and relevant. (Loki is trying to give an explanation to why he is implying a negative answer to Hulk's question).
  Such a conversational implicature can be cancelled by such continuation: "It's my roommate's birthday and we will go out for dinner. But I think tonight's game will be really exciting, so I'll try to wrap up the dinner early and join you once we're done."

Miscellaneous

- **Homework 3 due April 17**
- There's a typo on the previous version of HW3. Please ensure that you refer to the newest version posted on Blackboard.
- I will **not** hold my office hours this afternoon
- Please scan the QR code and complete the attendance form