

# HG2002 Semantics and Pragmatics

## Situations

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Lecture 5

Location: HSS Auditorium

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# Overview

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- Revision: Truth
  - Logic and Truth
  - Entailment
  - Presupposition
- TAM: Tense, Aspect and Modality
- Mood and Evidentiality
- Next week: Chapter 6: Participants

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# Revision: Sentence Relations and Truth

# Logic

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- Classical logic is an attempt to find valid principles of argument and inference.

<i>a</i>	If something is human then it is mortal	<b>premise</b>
<i>b</i>	Socrates is human	<b>premise</b>
<hr/>		
<i>c</i>	Socrates is mortal	<b>conclusion</b>

- Can we go from *a* and *b* to *c*? Yes
- Truth is **empirical**: The premises need to correspond with the facts of the world
  - Sentences have **truth values** (true, false or unknown)
  - The state of the world that makes a sentence true or false are its **truth conditions**

# Methods of Argument

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## ➤ Modus Ponens

*a* If something is human then it is mortal

*b* Socrates is human

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*c* Socrates is mortal

$p \rightarrow q, p \vdash q$

## ➤ Modus tollens

*a* If something is human then it is mortal

*b* Zeus is not mortal

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*c* Zeus is not human

$p \rightarrow q, \neg q \vdash \neg p$

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➤ **Hypothetical syllogism**

*a* If something is human then it is mortal

*b* If something is mortal then it dies

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*c* If something is human then it dies

$p \rightarrow q, q \rightarrow r \vdash p \rightarrow r$

➤ **Disjunctive syllogism**

(modus tollendo ponens: affirm by denying)

*p* Either a human is mortal or a human is immortal

*q* A human is not immortal

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*r* A human is mortal

$p \oplus q, \neg q \vdash p$

# Empirical truths and connectives

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$p$	$q$	$p \rightarrow q$	$p \wedge q$	$p \vee q$	$p \oplus q$	$p \equiv q$	$\neg p$
		if	and	or	XOR	iff	not
T	T	T	T	T	F	T	F
T	F	F	F	T	T	F	F
F	T	T	F	T	T	F	T
F	F	T	F	F	F	T	T

- Words themselves often carry more implications  
*I did A and B* often implies *I did A first*
- There are many ways of saying the operations

# Necessary Truth, A Priori Truth and Analyticity

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- Arguments from the speaker's knowledge
  - **A priori** truth is truth that is known without experience.
  - **A posteriori** truth is truth known from empirical testing.
  
- Arguments from the facts of the world
  - **Necessary truth** is truth that cannot be denied without forcing a contradiction.
  - **Contingent truth** can be contradicted depending on the facts.
  
- Arguments from our model of the world
  - **Analytic truth** Truth follows from meaning relations within the sentence.  
**can include word meaning**
  - **Synthetic truth** Agrees with facts of the world.

# Entailment

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## ➤ Entailment

*a* The evil overlord assassinated the man in the red shirt.

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*b* The man in the red shirt died.

A sentence  $p$  entails a sentence  $q$  when the truth of the first ( $p$ ) guarantees the truth of the second ( $q$ ), and the falsity of the second ( $q$ ) guarantees the falsity of the first ( $p$ ).

## ➤ Sources of Entailment

### ➤ Hyponyms

(1) *I rescued a dog today. vs I rescued an animal today.*

### ➤ Paraphrases

(2) *My mom baked a cake. vs A cake was baked by my mom.*

# Presuppositions

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- Many statements assume the truth of something else
  - (3) a. *Mary's sister bakes the best pies.*
  - b. *Mary has a sister.*
- Negating the presupposing sentence *a* doesn't affect the presupposition *b* whereas negating an entailing sentence destroys the entailment.
- Sources of Presuppositions
  - Names presuppose that their referents' exist
  - Clefts (*it was X that Y*); Time adverbial; Comparative
  - Factive verbs: *realize*; some judgement verbs: *blame*; ...
- Presupposition is one aspect of a speaker's strategy of organizing information for maximum clarity for the listener.

# Language meets Logic (again)

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- **formal semantics** is also known as
  - **truth-conditional semantics**
  - **model-theoretic semantics**
  - **Montague Grammar**
  - **logical semantics**
- A general attempt to link the meaning of sentences to the circumstances of the world: **correspondence theory**
  - If the meaning of the sentence and the state of the world **correspond** then the sentence is **true**

# Model-Theoretical Semantics

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1. Translate from a natural language into a logical language with explicitly defined syntax and semantics
2. Establish a mathematical model of the situations that the language describes
3. Establish procedures for checking the mapping between the expressions in the logical language and the modeled situations.

# Translating English into a Logical Metalanguage

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- Consider simple sentences
  - Represent the predicates by a capital **predicate letter** these can be n-ary
  - Represent the **individual constants** by lower case letters
  - Represent **variables** by lower case letters (x,y,z)
  
- Join simple sentences with logical connectives  
treat relative clauses as **and**
  - (4) *Bobbie who is asleep writhes*:  $A(b) \wedge W(b)$
  - (5) *Bobbie is asleep and Freddie drinks*:  $A(b) \wedge D(f)$
  - (6) *Freddie drinks and sleeps*:  $D(f) \wedge S(f)$
  - (7) *Freddie doesn't drink beer*:  $\neg D(f,b)$
  - (8) *If Freddie drinks whiskey Bobbie sleeps*:  $D(f,w) \rightarrow S(b)$

# Quantifiers in Predicate Logic

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➤ Quantifiers bind variables and scope over predications

➤ **Universal Quantifier** ( $\forall$ : *each, every, all*)

➤ **Existential Quantifier** ( $\exists$ : *some, a*)

(9) *All students learn logic*:  $\forall x (S(x) \rightarrow L(x,I))$

(10) *A student learns logic*:  $\exists x (S(x) \wedge L(x,I))$

(11) *Some students learn logic*:  $\exists x (S(x) \wedge L(x,I))$

(12) *No students learn logic*:  $\neg \exists x (S(x) \wedge L(x,I))$

(13) *All students don't learn logic*:  $\forall x (S(x) \rightarrow \neg L(x,I))$

➤ All variables must be bound

# Some Advantages in Translating to Predicate Logic

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- Explicit representation of scope ambiguity

(14) *Everyone doesn't love semantics*

a. *It is not the case that all people love semantics:*

$$\neg \forall x (L(x,s))$$

b. *All people have the property of not loving semantics:*

$$\forall x (\neg L(x,s))$$

- But the big advantage is in reasoning with the real world  
**denotational semantic analysis**

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# Situations

# Situations

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Here we look at the meanings of situations described by sentences: in particular how we can talk about time and belief.

- How are situations classified?
- How does classification affect the way we can talk about these situations?
- How are different types of verbs lexically biased towards describing situation types?

# Stative or Dynamic

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➤ Differences in states

- (15) *The museum is open.*
- (16) *The museum opens at nine.*
- (17) *The fruit is ripe.*
- (18) *The fruit is ripening.*

➤ A situation can be

- **Static**: stable for its duration
- **Dynamic**: change over time
- Which of the above are stative and which dynamic?

# Semantics motivates Syntax

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- There is typically a correlation between states and adjectives, and between verbs and dynamic situations.

(19) *I am writing a paper.*

(20) *The paper is hard to read.*

(21) *Kim poured water into the glass.*

(22) *The glass is full.*

- There are exceptions

(23) *Be brave!*

(24) *Sandy is being foolish.*

(25) *She knows what semantics is.*

(26) *He loves cats.*

(27) *The cat has green eyes.*

# Different Verb Classes

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- Verbs differ in whether they are stative or dynamic.

(28) *John knows how to drive.*

(29) *John learned how to drive.*

- **Stative**

- Steady situation, relatively unchanging
- no reference to an explicit start or endpoint

- **Dynamic**

- Situations that have internal phases

# Properties of Stative Verbs/Adjectives

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- Usually incompatible with progressive aspect

(30) *John is learning German.*

(31) *\*John is knowing German.*

- Usually strange with imperatives

(32) *Learn German!*

(33) *? Know German!*

- Exceptions: *remain, have, ...*

# Dynamic Verbs

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## ➤ Durative vs. Punctual

- whether situation described by verb lasts for a period of time or not

(34) *John blinked.* (punctual)

(35) *John slept.* (durative)

## ➤ Telic/Bounded/Resultative vs. Atelic/Unbounded

- whether situation described by verb has a natural point of completion

(36) *John built a raft.* (telic)

(37) *John gazed at the clouds.* (atelic)

If you interrupt a telic process, then it may not finish.

- Typically test with *in/for 10 minutes*: telic/atelic

## Depends on the whole sentence

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(38) *John was swimming.* (atelic)

(39) *John was swimming in the biathlon.* (telic)

- There is a derivational process to turn atelic into telic verbs in some languages.
  - German: *essen* “eat” → *aufessen* “finish eating”
- It can also be done with an auxiliary
  - Japanese: *kaku* “write” → *kaki-oeru* “finish writing”
- It can also be done with a particle
  - English: *eat* → *eat up*

# Punctual verbs

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- **Punctual verbs** (Semelfactive) describe events that occur for a brief moment
- They can get an **iterative** interpretation if the duration is prolonged

(40) *John coughed.*

(41) *John coughed all night.*

(42) *The traffic lights flashed.*

(43) *The traffic lights flashed the entire time.*

# Situation Types

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Situations	Stative	Durative	Telic	Examples
State	+	+		<i>desire, know</i>
Activity	—	+	—	<i>run, drive a car</i>
Accomplishment	—	+	+	<i>bake, walk to school, build</i>
Punctual	—	—	—	<i>knock, flash</i>
Achievement	—	—	+	<i>win, start</i>

- (44) *Kim desires more cowbell*
- (45) *Sandy drives to school*
- (46) *Hiromi compiled a lexicon*
- (47) *Bobby tapped on the window*
- (48) *Alex lost the race*

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# Tense

## Tense, Aspect and Modality

- We need to distinguish grammatical expression from meaning
  - Tense vs Time
  - Grammatical Aspect vs Semantic Aspect
  - Mood vs Modality
  - Surface Case vs Deep Case
- The relation between them is referred to as
  - linking; syntax-semantics interface; grammar

# How Universal is Tense?

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- Grammatical tense is different from semantic time
- English has **past/non-past**
- Latin marks **past/present/future**
- Chibemba (Bantu) has **metrical tense**
  - Remote Past (< yesterday)
  - Removed Past (yesterday)
  - Near Past (today)
  - Immediate Past (past few hours)
  - Immediate Future (next few hours)
  - Near Future (today)
  - Removed Future (tomorrow)
  - Remote Future (> tomorrow)

# Tense and Time

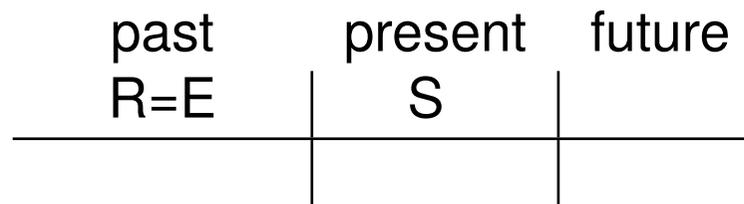
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- Locate a situation to with respect to a point in time
  - S = speech point
  - R = reference time
  - E = event time
- Hans Reichenbach (1947)

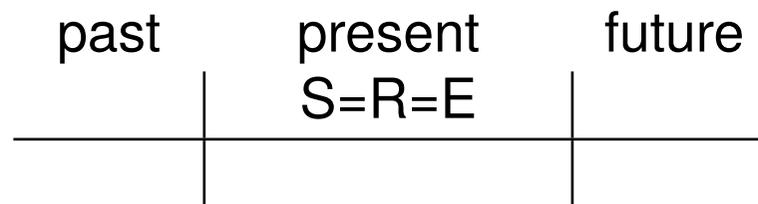
# Simple Tense

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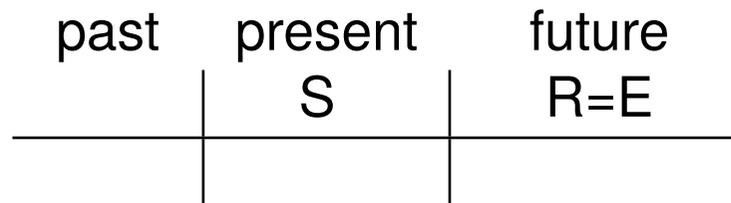
➤ Past ( $R = E < S$ ) *saw*



➤ Present ( $R = S = E$ ) *see*



➤ Future ( $S < R = E$ ) *will see*



# Complex Tense

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- Past Perfect ( $E < R < S$ ) *had seen*
- |      |         |        |
|------|---------|--------|
| past | present | future |
| E R  | S       |        |

*By 1939 my Father had seen many arrests*

- Future Perfect ( $S < E < R$ ) *will have seen*
- |      |         |        |
|------|---------|--------|
| past | present | future |
|      | S       | E R    |

*By 2039 my son will have seen many things*

# Aspect in English

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- Finer grained talking about time!
- **Progressive** is used for ongoing processes (unfinished)
  - **Past Progressive** *I was building the building*
  - **Present Progressive** *I am building the building*
  - **Future Progressive** *I will be building the building*
- **Perfect** compares the time to the reference point
  - **Past Perfect** *I had built the building* ( $E < R < S$ )
  - **Present Perfect** *I have built the building* ( $E < R = S$ )
  - **Future Perfect** *I will have built the building* ( $S < E < R$ )

# Aspect more Generally

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- **Perfective** focuses on the end point
  - **Completive** *I built the building*
  - **Experiential** *I have built the building*
  
- **Imperfective**
  - **Progressive** *I was listening/I am listening*
  - **Habitual** *I listen to the Goon Show*
  
- Different languages grammaticalize different things

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# Mood

# Mood and Modality

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- Modality expresses varying degrees of the speaker's commitment and belief

- (49) *She has left by now.*
- (50) *She must have left by now.*
- (51) *She could have left by now.*
- (52) *She needn't have left by now.*
- (53) *She couldn't have left by now.*
- (54) *She has to leave by now.*
- (55) *She must leave by now.*
- (56) *She can leave now.*

## Other means of expression

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➤ Explicit External Verb

(57) *I know that S*

(58) *I believe that S*

➤ Adverb or Adjective

(59) *It is certain that S*

(60) *It is likely that S*

(61) *I will probably S*

(62) *I will definitely S*

# Knowledge vs Obligation

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- **Epistemic modality:** Speaker signals degree of knowledge.

(63) *You can drive this car* (You are able to)

- **Deontic modality:** Speaker signals his/her attitude to social factors of obligation and permission.

- **Permission**

(64) *You can drive this car* (You have permission to)

(65) *You may drive this car*

- **Obligation**

(66) *You must drive this car* (You have an obligation to)

(67) *You ought to drive this car*

# Possible Worlds

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➤ We can analyze these in terms of **possible worlds**

➤ We mark how close a hypothetical case is to reality:

(68) *It must be/might be/is/can't be hot outside*

➤ Similarly for **conditionals** (condition/consequence)

(69) *If it is Singapore, it will be hot outside*

(70) *If it were Singapore, it would be hot outside*

(71) *If you should go to Singapore, take some cool clothes*

# Real vs Hypothetical

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- **Realis** is used for things that occur
- **Irrealis** is used for things that are not claimed to occur (hypotheticals, negation, future)
- English doesn't mark this normally
  - (72) *If I were to go* (subjunctive)
- What about Singlish? ???
  - (73) *I got go.*
  - (74) *I sure confirm go.*
  - (75) *I maybe go.*

# Mood more Generally

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- Grammatical Inflection used to mark modality is called **mood**
  - **indicative** expresses factual statements
  - **conditional** expresses events dependent on a condition
  - **imperative** expresses commands
  - **injunctive** expresses pleading, insistence, imploring
  - **optative** expresses hopes, wishes or commands
  - **potential** expresses something likely to happen
  - **subjunctive** expresses hypothetical events; opinions or emotions
  - **interrogative** expresses questions
  
- English only really marks imperative and subjunctive morphologically on **be**
  - (76) *Be good!*
  - (77) *If I were a rich man*

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# Evidentiality

# Evidentiality

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- Some languages must show you gained the evidence
  - **nonvisual sensory**: speaker felt the sensation
    - \* /p<sup>h</sup>a·bék<sup>h</sup>-ink'e/ “burned, I felt it”
  - **inferential**: speaker saw circumstantial evidence
    - \* /p<sup>h</sup>a·bék<sup>h</sup>-ine/ “must have burned”
  - **hearsay (reportative)**: speaker is reporting what was told
    - \* /p<sup>h</sup>a·bék<sup>h</sup>-le/ “burned, they say”
  - **direct knowledge**: speaker has direct evidence, probably visual
    - \* /p<sup>h</sup>a·bék<sup>h</sup>-a/ “burned, I saw it”

# Evidentiality in English

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We can, and often do, mark evidentiality in English, although it is not strongly grammaticalized.

- (78) *Bob is hungry.*
- (79) *Bob looks hungry.*
- (80) *Bob seems hungry.*
- (81) *Bob is apparently hungry.*
- (82) *Bob would be hungry by now.*
- (83) *Look at those clouds! It's going to rain!*
- (84) *Look at those clouds! # It will rain!.*

# Summary of Situations

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- Verb/Situation Types
  - Stative
  - Dynamic
    - \* Punctual
    - \* Durative
      - Telic/Resultative
      - Atelic
- Tense/Aspect and Time: R, S and E
- Modality
  - Epistemic
  - Deontic: Permission, Obligation
- Evidentiality

# ObJoke

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- PAST, PRESENT, and FUTURE walked into a bar. It was **tense**.
- Luckily, auxiliary **have** got a booth with a past participle. It was **perfect**.

## Acknowledgments and References

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- *Anne Elk's Theory on Brontosauruses* is a sketch from the thirty-first Monty Python's Flying Circus episode, *The All-England Summarize Proust Competition*.