**1** Background: Meaning and Logic

**3** Imperatives, Connectives and Truth

## Outline

2 Imperatives

The Dilemma

Imperatives, Semantics & Logic

Representation and Expression in Natural Language

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Logic Logical Consequence

- Everyone is happy (1)
- So: Ernie Lepore is happy (2)

#### The Questions of Logic

- Why does (2) follow from (1)?
- Why doesn't (1) follow from (2)?
- Generally: why do some sentences follow from others?
- Why is (2) a logical consequence of (1)?

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Meaning Answering the Questions of Logic

#### The Semantic Answer (Frege, Tarski & others)

(Semantics: the study of meaning)

• Some sentences follow from others because of what those sentences **mean** 





Frege (1884)

Tarski (1956)

## The Semantic Answer

The Truth-Conditional Theory of Meaning

#### New Questions

- What is **meaning**?
- How can meaning make some sentences follow from other sentences?
- Frege (1884), Wittgenstein (1922), Tarski (1956) and others answered this question with the **Truth-Conditional Theory of Meaning**

#### The Truth-Conditional Theory of Meaning

- **1** Sentence meaning = truth-conditions
- **2** What are truth-conditions?
  - The ways the world has to be if the sentence is true

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## Truth-Conditional Semantics

- Meaning of "b is a cube":  $\llbracket b$  is a cube] =  $\{w_1, w_2\}$ 
  - $\{w_1, w_2\}$  is a **proposition** (Stalnaker 1976)



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## Truth-Conditions Further Explained Ways the World Could Be: Possible Worlds

Ways the world could be  $W = \{w_1, w_2, w_3, w_4\}$ 





 $w_1$ 



 $w_3$ 



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4/33

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## Truth-Conditional Semantics In General

#### The Basic Theses

- **1** The meaning of a sentence is its truth-conditions
  - The meaning of a sentence is a proposition
- 2 A sentence's truth-conditions are determined by the meanings of it's words

#### The Meanings of Words

Names (*Peter*, *Mary*) refer to things

Predicates (blue, dance) refer to concepts

**Connectives** (*not*, *and*, *or*) create a proposition from one or more other propositions

## Truth-Conditional Semantics

Connectives: the example of not

- Not forms opposite proposition: [not P] = W [P]
- $\llbracket b \text{ is not a cube} \rrbracket = W \llbracket b \text{ is a cube} \rrbracket = \{w_3, w_4\}$



 $w_1$ 





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## Truth-Conditional Semantics Back to Logical Consequence

#### Back to Our Question

- Why are some sentences logical consequences of others?
- When is a sentence C is a logical consequence of others  $P_1 - P_n?$

#### The Answer

- When every way of making  $P_1, \ldots, P_n$  true is also a way of making C true
- In other words: the truth of  $P_1, \ldots, P_n$  guarantees the truth of C
- In yet other words: every possibility in  $[\![P_1]\!], \ldots, [\![P_n]\!]$ is also in  $\llbracket C \rrbracket$

## Truth-Conditional Semantics The Example of not

### The Meaning of Connectives

- **1** The meaning of a connective is a way of creating a proposition from one or more propositions.
- **2** Connectives: *or*, *not*, *and*, etc.
- *Not* forms the opposite proposition:
  - [not P] = W [P]
- And takes the shared possibilities from 2 propositions •  $\llbracket P \text{ and } Q \rrbracket = \llbracket P \rrbracket \cap \llbracket Q \rrbracket$
- Or combines all possibilities from 2 propositions
  - $\llbracket P \text{ or } Q \rrbracket = \llbracket P \rrbracket \cup \llbracket Q \rrbracket$

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Truth-Conditional Semantics Logical Consequence: An Example

 $[\![b \text{ is small}]\!] = \{w_2\}, [\![b \text{ is small or } b \text{ is a cube}]\!] = \{w_1, w_2\}$ So P or Q follows from P







 $w_4$ 

## Background Highlights

#### Logical Semantics

- 1 Meaning is whatever is needed to explain logical consequence
- **2** Logical consequence is about truth: truth-preservation
- $\mathbf{3}$  So: meaning = truth-conditions
- **4** This theory predicts certain logical patterns:
  - For example: P or Q follows from P

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### Imperatives Preliminaries

#### The Imperative

- (3) Drink a beer!
  - (3) is an imperative, (4) is a modal declarative
    - (4) You should/must/ought-to drink a beer
  - English signals imperative mood with syntax and prosody
  - Other languages have explicit morphemes for this purpose (Aikhenvald 2010)

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Background: Meaning and Logic Imperatives Imperatives, Connectives and Truth The Dilemma References Imperative Consequence Some Imperatives Follow from Others: And	Background: Meaning and Logic Imperatives Imperatives, Connectives and Truth The Dilemma References Imperative Consequence Some Imperatives Follow from Others: <i>if</i>
John: Don't smoke indoors! Mary: Don't play soccer indoors!	John: Say "No thank you" if Mary offers you a drink Mary: Would you like a drink?
<ul><li>From John and Mary's commands I may infer:</li><li>Don't smoke indoors and don't play soccer indoors</li></ul>	<ul><li>From John and Mary's commands I may infer:</li><li>Say "No thank you"</li></ul>
Imperative inference with And         • So !P and !Q follows from !P and !Q	Imperative Inference with If         • So !Q follows from !Q if P and P

### Imperative Consequence Some Imperatives DON'T Follow from Others

Imperative Consequence Some DECLARATIVES Follow from Imperatives

#### John: Take out the garbage!

From John's command I may not infer:

• Take out the garbage or play video games

#### Imperative Inference with Or (Ross 1941)

• So *!P or !Q* does not follow from *!P* 

#### John: Dance!

From John's command I can infer:

• I may dance

Imperative Inference with Or

• So May P follows from !P



## Imperatives Aren't True or False

### Mary: Drink a beer!

Me: That's false. ?!?!?!

#### Imperatives Aren't True or False

- 1 Imperatives cannot be seriously evaluated for truth or falsity
- **2** So imperatives do not have truth-conditions

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### Imperatives and Logic One Dead-End

- Many researchers' response: imperatives have a different kind of content (Hofstadter & McKinsey 1939; McGinn 1977; Portner 2004)
- These theories must offer different analyses of logical consequence for imperatives and declaratives
- They must also have connectives combine imperatives and declaratives differently
  - Imperative and declarative content are *different*
  - Recall Or
- Thus, all connectives have two different meanings

#### Objections

- 1 And, Or and If can connect imperatives to declaratives
- **2** Declaratives can be logical consequences of imperatives

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## Imperatives and Logic The Dilemma

#### **Logical Semantics**

- 1 Meaning is whatever is needed to explain logical consequence
- **2** Logical consequence is about truth: truth-preservation
- **3** So: meaning = truth-conditions
- **4** This theory predicts certain logical patterns:
  - For example: P or Q follows from P

#### Facts about Imperatives

- Some imperatives follow from others; others do not
  - $!P, !Q \vDash !P$  and  $!Q, !P \nvDash !P$  or !Q
- **2** Imperatives do not have truth-conditions
- **3** Connectives can mix imperatives and declaratives

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20/33

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## Imperatives and Logic Pessimism and Quietism

- Austin (1962) and Wittgenstein (1953): give up on mathematical approaches to meaning altogether
- They criticized logical semantics for focusing solely on truth and representation
- This leaves out the expressive dimension of language
- Language doesn't just represent the world, it also expresses a particular attitude about what it represents

#### My Project

- I agree with Austin and Wittgenstein that representation is just one facet of language
- But I disagree with them that this forces us to give up on a mathematical theory of meaning

# Preference, Rationality & Context

#### Contextual Information

- As communication and inquiry unfold, a body of information accumulates.
- Think of this information as what the agents are mutually taking for granted in some way.
- It provides a shared resource that the participants can rely on when communicating.

(Stalnaker 1978; Lewis 1979)

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Preference, Rationality & Context Preferences

- Agents not only gather information and identify competing alternatives, they form **preferences** regarding those alternatives
- Central to **decision theoretic** approaches to rational choice, as applied in philosophy, AI and economics (e.g. Ramsey 1931; Hansson & Grüne-Yanoff 2009)
- Identifying an issue introduces a goal of finding *any* of the alternatives
- Forming a preference introduces a hunch about or desire for finding a particular alternative
- Of particular interest: the preferences being mutually taken for granted for the purposes of an interaction

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## Preference, Rationality & Context



Figure: Accepting the information that A

- Inquiry progresses by gaining information, i.e. the elimination of possibilities.
- $\{w_{\mathsf{AB}}, w_{\mathsf{Ab}}, w_{\mathsf{aB}}, w_{\mathsf{ab}}\} \Rightarrow \{w_{\mathsf{AB}}, w_{\mathsf{Ab}}\}$

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Preference, Rationality & Context Preferences

- A body of preferences can be represented as a binary **preference relation** on the alternatives
- I.e. a set of pairs of propositions constructed from  $\boldsymbol{c}$

### Preference State (R)

- *R*: binary relation on a set of alternatives (propositions)
- R(a, a'): a is preferred to a'
- Each pair in R is called a *preference*



**Figure**: Coming to prefer A (to  $\neg$ A)

## Preference and Meaning

#### The Semantics

- 1 The meaning of a sentence is the characteristic role it plays in changing states of minds
- **2** Declaratives create more informed states of mind
- 3 Imperatives create directed states of mind (preferences)
- **4** Logical consequence is **not** defined in terms of truth
- Logical consequence: after accepting some sentences, other sentences will fail to change anything
  - Declaratives: fail to provide more information
  - Imperatives: fail to provide additional directions
- **6** This semantics captures all of the facts mentioned earlier about imperatives

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## Conclusions Meaning and Logic

- 1 Meaning is whatever is needed to explain logical consequence
- **2** Meaning is not truth-conditions

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- **3** Meaning is about changing mental states
- Since some mental states have truth conditions, some sentences do too
- But there are more to mental states, and more to sentences too
- 6 All sentences have an expressive dimension over and above their representational dimension
  - How they change mental states

## Thank you!

Slides will be posted at http://williamstarr.net/research.html

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27/33

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31/33

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32/33

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