

# Topics in Philosophy of Language

ESSLLI 2011 - Logic & Language Session

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## Why this course at ESSLLI?

Formal semantics for natural language, one of the core ESSLLI disciplines, emerged in the late 60's and early 70's as a result of logicians' interest in natural language phenomena, also driven by philosophical puzzles.

Our aims: go back to the problems that have shaped the foundations of what are nowadays considered mainstream semantic frameworks; clarify the interplay between philosophical issues, logical issues and semantic issues, and assess the respective contributions and methodological impacts from the three disciplines..

Our focus: indexicality and other forms of context-dependence.

## **What audience for does the course target?**

- Students without background in any of the disciplines: a crash-course in philosophy of language and semantics + solid basis for further study
- Semanticians: an insight into the theoretical underscorings of various frameworks + an introduction to foundational issues in semantics
- Philosophers: an up-to-date, formally informed phil of language course, addressing both classical issues (relationship between meaning, content and truth) and recent ones (such as the contextualism/relativism debate)
- Logicians: an application of model-theoretic tools to natural language + a peek into certain issues in philosophical logic (validity vs. necessity).

## Tentative schedule

- Monday:* The early days (Montague, Lewis, Kaplan)  
Semantics for intensional indexical languages; double-indexing
- Tuesday:* Kaplan's framework cont'd: double-indexing vs. two levels of meaning  
Lewis's concerns; validity vs. necessity; what is said; a bit of Perry 2001
- Wednesday:* Stalnaker's two-dimensional approach; semantics vs. pragmatics  
Fregean assumptions behind standard frameworks; propositions  
Situation semantics: Barwise and Perry, its decline, its revival
- Thursday:* The semantics/pragmatics distinction: "unarticulated constituents"  
Contextualist challenges to truth-conditional semantics
- Friday:* Our days: semantic relativism; context-sensitivity vs. assessment-sensitivity; predicates of personal taste and epistemic modals

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Lecture 1

**a model-theoretic approach to context-  
dependence in natural language**

***back to the founding fathers***

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1.1: conceptual preliminaries

**forms of context-dependence:  
ambiguity, indexicality, implicature**

## **Two basic forms of context-dependence: ambiguity vs. indexicality**

### **ambiguity (including polysemy)**

‘Bill went to the bank’, ‘John is very rich and happy’, etc. Interpretation depends on the context (topic of conversation intentions of the speaker, previous discourse, etc.), but this dependence is “pre-semantic”: context is required to determine the semantically interpretable items

### **indexicality**

The interpretation of e.g. ‘I arrived yesterday’ depends on context (who is speaking, when and where, what is being referred to, etc.), but this dependence is governed or constrained by the meaning

## **A change of attitude towards context-dependence in the late 60's**

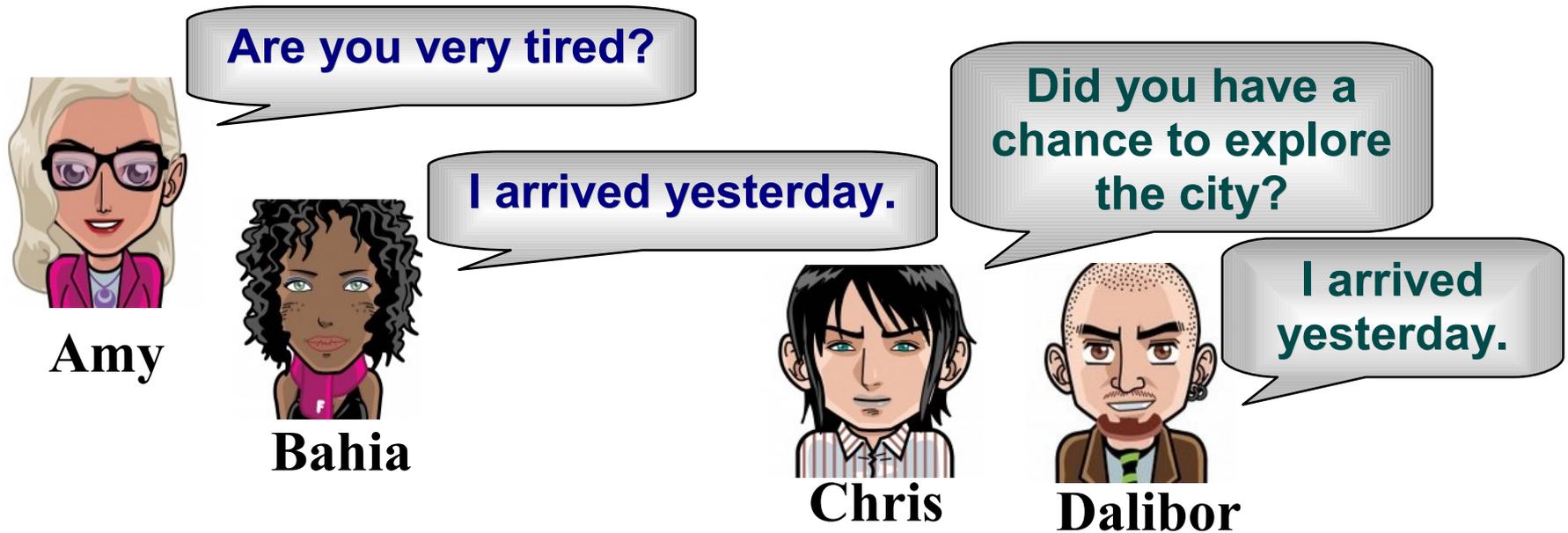
### **Before: context-dependence as a flaw**

"If our language were logically more perfect, we would perhaps have no further need of logic, or we might read it off from the language. But we are far from being in such a position. Work in logic just is, to a large extent, a struggle with the logical defects of language" (Frege 1915: 323)

### **After: context-dependence as a must**

"Expressions used by different people, in different space-time locations, with different connections to the world around them, can have different interpretations even though they retain the same linguistic meaning. (...) That's what we are calling *efficiency*." (Barwise & Perry 1983: 5)

## Further forms of context-dependence: saying vs. conveying



Bahia and Dalibor both *say* and *convey* different things. The former difference is indexicality (semantics); the latter, implicature (pragmatics).

## **Philosophers' attitudes towards context-dependence today**

### **Pessimistic views** (eg Semantic Minimalism & Radical Contextualism)

Semantics can only deal with very little (basically, indexicals like 'I' and 'now', if even that much). The variety of context-dependence phenomena requires a full-blown pragmatic theory.

### **Optimistic views** (eg Indexical Contextualism & Semantic Relativism)

Indexicals are just a garden-variety of context-dependence phenomena that are an object of study for semantics; there are many more (gradable adjectives, quantifier domain restriction, predicates of taste, knowledge and belief ascriptions, modalities, conditionals, evidentials etc.); work on these makes our semantic theories move forward.

1.2: technical preliminaries

**semantics for familiar formal languages  
(FOL, QML)**

Model-theoretic approach to the semantic of natural language:  
idea (Montague): apply tools used for formal languages to English

Paradigms: first order logic (FOL), quantified modal logic (QML)

FOL. (a) Syntax: a recursive definition of well-formed expressions:

- if  $\alpha$  is a term and  $\pi$  a predicate letter, then  $\pi(\alpha)$  is a formula
  - if  $\varphi$  and  $\psi$  are formulae, then  $(\varphi \wedge \psi)$  is a formula
  - if  $\varphi$  is a formula and  $x$  a variable, then  $\forall x\varphi$  is a formula
- etc.

## Semantics:

A repertoire of items in the metalanguage:

- a collection of individuals  $U$  (a 'universe'); two truth-values  $\{T, F\}$

A structure (or model)  $M :=$  a pair ( $U_{\text{universe}}$ ,  $\text{Int}_{\text{erpretation function}}$ );

Assignment of semantic-values to simple expressions:

- for  $\alpha$  an indiv. constant,  $[[\alpha]]^M = \text{Int}^M(' \alpha ') \in U$
- for any  $n$ -place predicate letter  $\pi$ ,  $[[\pi]]^M = \text{Int}^M(' \pi ') \subseteq U^n$

A recursive assignment of semantic values to complex expressions:

- if  $\varphi$  is of the form  $\pi(\alpha)$ ,  $\pi$  a one-place predicate and  $\alpha$  a singular term, then  $[[\varphi]] = T$  iff  $[[\alpha]] \in [[\pi]]$
- if  $\varphi$  is of the form  $(\psi \wedge \chi)$ , then  $[[\varphi]] = T$  iff  $[[\psi]] = [[\chi]] = T$ , etc.

Variables. Semantic value is relative to assignment.

If  $\phi$  is of the form  $(\forall x)(\psi)$ ,  $[[\phi]]_f = T$  iff  $[[\psi]]_g = T$  for all assignments  $g$  just like  $f$  except at most for  $\theta$ .

The semantic value (=truth value) of an open formula depends interestingly on the assignment of values to variables:

$[[Fx]]_f \neq [[Fx]]_g$ , as long as  $f(x) \neq g(x)$

The semantic value of a closed formula (sentence) does not:

$[[\forall x Fx]]_f = [[\forall x Fx]]_g$  in either case, = T iff  $[[Fx]]_h = T$  for all  $h$

FOL requires a parameter over and above the mere structure of interpretation: an assignment of values to the free variables

Link with indexicals & implicit arguments in natural language:

“Bill is late.”  $\dashv\vdash$   $F(b, x)$

truth-clause:  $[[F(b, x)]]_f^M = T$  iff  $\langle \text{Int}^M('s'), f(x) \rangle \in \text{Int}^M(F)$

Semantic value is relative to structure  $M$  and assignment  $f$ :

$[[\alpha]]^M_f = \text{Int}^M(\alpha)$ ,  $[[\theta]]^M_f = f(\theta)$ ,  $[[\pi]]^M_f = \text{Int}^M(\pi)$ , etc.

Validity (logical truth):  $\phi$  is valid  $\text{iff}_{\text{def}}$  for all  $M$  and for all  $f$ ,  $[[\phi]]^M_f = T$

NB: not all expressions' semantic value varies across models.

E.g. is  $\phi$  of the form  $(\psi \wedge \chi)$ ,  $[[\phi]]^M_f = T$  iff  $[[\psi]]^M_f = [[\chi]]^M_f = T$

$[[\wedge]]^M_f =$  the truth-function  $\text{Con}$  such that  $\text{Con}(t_1, t_2) = T$  iff  $t_1 = t_2 = T$

$\wedge$  as a 'logical constant' (and so is 'every', 'necessarily' (in ML), etc.)

In modal logic, the truth predicate is relativized to the world parameter, also deployed in the truth-clauses for intensional operators Nec ( $\Box$ ) and Poss ( $\Diamond$ ).

**truth clause:**  $[[\Box\varphi]]^M_w = T$  iff  $\forall w'$  s.t.  $wRw'$ ,  $[[\varphi]]^M_{w'} = T$

Structures of interpretation are triples  $(W, R \subseteq W^2, Int)$

The role of accessibility relations

Example:  $p \wedge \Box p$  is not logically false (in basic ML)

## Quantified modal logic (QML)

A structure  $S$  is now a quadruple ( $U_{\text{niverse}}$ ,  $W_{\text{orlds}}$ ,  $R$ ,  $I_{\text{nterpretation function}}$ );

A model is a triple  $(S, w, f)$ , where  $w \in W$  (the “designated” world)

Validity:  $\phi$  is valid iff for all  $M$ , for all  $w$ , and for  $f$ , all  $[[\phi]]_{w, f}^M = T$

Tense logic is a modal logic in which “worlds” are thought of as moments, and the intensional operators are temporal operators.

Some (recursive) truth-clauses:

$$[[ \text{sometime in future } \varphi ] ]^M_t = T \text{ iff } \exists t' > t: [[ \varphi ] ]^M_{t'} = T$$

$$[[ \text{always in past } \varphi ] ]^M_t = T \text{ iff } \forall t' < t: [[ \varphi ] ]^M_{t'} = T$$

Two universal modalities (always-fut and always-past) and two existential modalities.

Index-theory. A multi-modal logic - other than the usual modalities, and the temporal operators, there are « locational » operators, operators on « agents », etc.

*For more general situations one must not think of the  $i \in I$  as anything as simple as instants of time or even possible worlds. In general we will have  $i = (w, t, p, a, \dots)$  where the index  $i$  has many coordinates: for example,  $w$  is a world,  $t$  is a time,  $p$  is a ... position,  $a$  is an agent, etc. All these coordinates can be varied, possibly independently, and thus affect the truth values of statements which have indirect reference to these coordinates.*

Dana Scott's Advice on Modal Logic.

1.3

**arguments for double-indexing**

An example that shows that present tense is not redundant:

- 1) Once, a child was born that would become a king.
- 1') Once, a child was born that *will* become a king.

- a)  $\langle \text{Past} \rangle \exists x (\text{Child}_x \wedge \text{Born}_x \wedge \langle \text{Fut} \rangle (\text{King}_x))$
- b)  $\langle \text{Past} \rangle \exists x (\text{Child}_x \wedge \text{Born}_x) \wedge \langle \text{Fut} \rangle (\text{King}_x)$
- c)  $\exists x (\langle \text{Past} \rangle (\text{Child}_x \wedge \text{Born}_x) \wedge \langle \text{Fut} \rangle (\text{King}_x))$

Another problematic example:

Someday, everything that is flourishing will be faded.

a)  $\langle \text{Fut} \rangle \forall x (\text{Flo}_x \rightarrow \text{Faded}_x)$

b)  $\forall x (\text{Flo}_x \rightarrow \langle \text{Fut} \rangle \text{Faded}_x)$

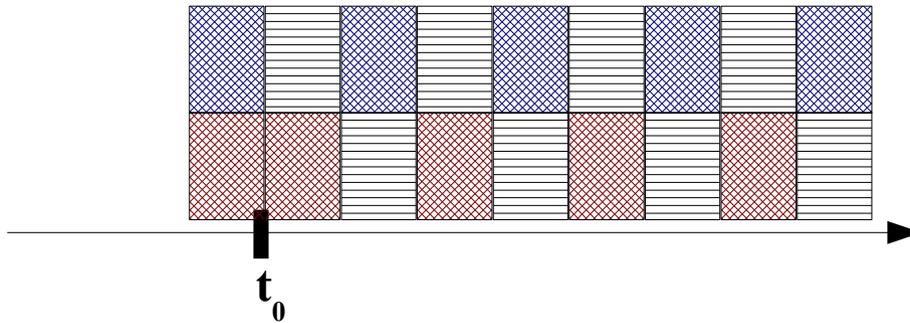
It may be argued that neither formula accounts for the intended reading, which is that there is a future day such that everything that flourishes now will be faded on that day.

The upshot of this example is that either you need overt quantification over times, or you need a two-dimensional temporal framework (or, a double-index theory).

c)  $\langle \text{Fut} \rangle \forall x (\text{Now}(\text{Flo}_x) \rightarrow \text{Faded}_x)$

d)  $\exists t (t > t_0 \wedge \forall x (\text{Flo}(x, t_0) \rightarrow \text{Faded}(x, t)))$

It is easy to think of examples with 'actually' that similarly show that we need (at least) two *world* parameters.



b)  $\forall x((\text{Flo}_x) \rightarrow \langle \text{Fut} \rangle \text{Faded}_x)$

c)  $\langle \text{Fut} \rangle \forall x(\text{Now}(\text{Flo}_x) \rightarrow \text{Faded}_x)$

*In this case, b is false while c is true.*

Truth clauses for '<fut>' and 'now' in double-time tense logic:

$$[[\langle \text{Fut} \rangle \varphi]]^M_{t_1, t_2} = T \text{ iff } \exists t \ t > t_2 \ [[\varphi]]^M_{t_1, t} = T$$

$$[[\text{now } \varphi]]^M_{t_1, t_2} = T \text{ iff } [[\varphi]]^M_{t_1, t_1} = T$$

## Kaplan's double-indexed semantics for indexicals

$$[[\diamond\varphi]]^M_{f, c, w, t} = T \text{ iff } \exists w' wRw' [[\varphi]]^M_{f, c, w', t} = T$$

$$[[\text{Act}\varphi]]^M_{f, c, w, t} = T \text{ iff } [[\varphi]]^M_{f, c, w(c), t} = T$$

$$[[\langle \text{Fut} \rangle \varphi]]^M_{f, c, w, t} = T \text{ iff } \exists t' t < t' [[\varphi]]^M_{f, c, w, t'} = T$$

$$[[\text{Now}\varphi]]^M_{f, c, w, t} = T \text{ iff } [[\varphi]]^M_{f, c, w, t(c)} = T$$

$$[[\varphi(I)]]^M_{f, c, w, t} = T \text{ iff } [[\varphi(x)]]^M_{f', c, w, t} = T, \text{ where } f' \text{ is like } f$$

except that  $f(x)=a(c)$

The two "indices" are contexts (c) and circumstances (w, t);  
 $a(c)$ ,  $p(c)$ ,  $w(c)$ ,  $t(c)$  are agent, place world and time of c

So much for today.

Thank you for your attention.



Questions? Objections? Suggestions?