Models in Formal Semantics and Pragmatics

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Schedule (Slot 4, 17:00-18:30)

Mo	*Introduction*	Kaufmann/Kaufmann
	What model theory does, and does not do	Glanzberg
Tu	*Proof-theoretic semantics as a viable alternative to model-theoretic semantics for natural language*	Francez
	Assumptions about admissible models and the semantics	Yanovich
	Frames and attributes	Petersen
We	*A conceptual-epistemic perspective on model theory*	Djalali/Lauer
	Semantic values and model-theoretic 'semantics'	Zimmermann
Th	*Conceptual spaces as a basis for semantic modelling*	Gärdenfors
	Logical consequence: From logical terms to semantic constraints	Sagi
	Truth in a model as a model of truth	Glick
Fr	*Embodied models*	Sauerland/Tomlinson
	What kind of theory is a model-theoretic semantics of a natural language?	Peters

Meaning relative to a model

Montague; Dowty, Wall & Peters, 1981

- $\mathcal{L}$: set of (syntactically unambiguous) expressions
- M (simplest case): structure $\langle D, F \rangle$
  - D: non-empty set
  - F: interpretation of the non-logical vocabulary in $\mathcal{L}$
- $[\![\cdot]\!]$: interpretation of complex expressions (in terms of parts)

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Refinements:

- possible worlds; times
- events; situations
- scales; degrees
- contextual parameters
- . . .

Meaning relative to a model

Recurring questions:

- What does this framework tell us about *meaning* (e.g., as applied to a natural language like English)?
- What is (or should be) the relationship between M and
  - the facts of the world?
  - the linguistic knowledge of competent speakers?
- What should models look like?
  - What are the domains, how are they structured?
- What are the alternatives?

Models and reality

"Language-to-world grounding" (Partee, 1980)

Grounding assumption:

Models *represent* or *correspond to* the subject matter that the object-language expressions are about.

- Of course, these abstract objects can and should be thought to *represent* individuals and situations, but it is important to realize that they are neither. (Zimmermann, 1999:540)

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➽ **Grounding problem:**
Despite the intuitive validity of the grounding assumption, it is not obvious how to reconcile it with model theory.

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Some responses to the Grounding problem:

- Drop the Grounding assumption. . .
  - and use models for what they're good for.
  - and develop a separate theory about the relationship between models and reality.
- Keep the Grounding assumption. . .
  - and address the consequences.
  - but devise special models with correspondence built in.
- Abandon models. . .
  - and make do with language-independent representations.
  - and treat meaning as an inference process.
- *Other options? Consequences of specific views? Criteria for choosing?*

Models and reality

Dropping Grounding: Models are just models

A semantic theory is a set of *constraints on models*.

- Grammar dictates certain aspects (e.g., the domain of the interpretation function)
- "Meaning postulates" do the rest (e.g., lexical relations)

- **Example:** A model defined for English is not a model of English unless $F('walks')$ is a subset of $F('moves')$ (everywhere).
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- **Objection:** This misses crucial information: No amount of such constraints would tell us what the meanings really *are*! (LePore, Higginbotham, Zimmermann, . . .)
- **Reply:** But that's a lot. And is the rest really *linguistic* information?

Puzzle: *(Infinitely) many different* models represent what linguistic expressions are about. – *What to do with this variation?*

Strategy 1: Embrace this variation

- Reflects a parameter of variation within the semantic theory of a given natural language (–*But which?*)
- Meta-theoretical: epistemic uncertainty of the linguist

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Strategy 2: Eliminate this variation

- Meaning postulates to single out the one and only intended model? (–*Hopeless!*)
- Assume the one intended model: an exact representation of the logical space the actual world belongs to.
- Pushing further: eliminate models in favor of absolute interpretation (Heim & Kratzer, 1998)

  ➽ $[\![\text{'sleeps'}]\!]^w = \{x \mid x \text{ is an individual in } w \text{ s.t. } x \text{ sleeps in } w\}$

  Model-theory gone disquotational (Glanzberg, t.a.)

Models and reality
Abandoning models

- An old contender: **Structural Semantics** (e.g., Katz)
  - an uninterpreted formal language to represent meaning
- A thriving contender: **Proof theory**
  - From reference to inference
  - Potentially close to cognitive processes
  - A grounding problem for proofs?

    What does the choice of inference rules stand for?
    What does it reflect to have different proofs for same set of premises and conclusion?
    What is reflected by the hypothetical assumption of the premises?
    ...

(Further) applications of semantic theory

What are the implications of our theoretical choices for a semantic theory of:

- Language change
- Synonymy across languages
- Uncertainty/misconceptions about the words of one's language (or: uncertainty/misconception what language it is)?
- ...

Facing even more fundamental questions...

- **Methodological standards**
  - Formal rigor
  - Computational complexity
- **What is our object of study?**
  - a system of symbols?
  - a tool for communication and reasoning?
  - the knowledge of competent speakers?