

NASSLLI-18
Philosophy of Language
Lecture 2
Time, Modality, and Intensionality
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Time and Tense Logic

Fairly Specialized Issues

- A great deal of the extensive and venerable body of work on the philosophy of time is not especially relevant to linguistic concerns.
- There are two questions to consider here:
 1. Philosophers have found time to be problematic—so problematic that some have denied its existence. Do any of these problems reappear in the temporal semantics of natural languages?
 2. Can philosophers learn anything useful from linguistic insights into the semantics of time?

Decontextualization and Objectivity

- We can either live “in the moment” or take a broader perspective where we think of a succession of events from a perspective that is “presentless”—that is not attached to any particular point along a history.
- Many of the philosophical problems about time have to do with this contrast between experiencing and reflecting on it.
- This may have be related to Aristotle’s puzzlement about the nature of the present: “Does it always remain one and the same or is it always other and other? It is hard to say.”

Tense Logic

and the Semantic Theory of Tense

Decontextualize

- The fundamental semantic relation is $M, t \models \phi$.
- For instance, $M, t \models [\text{Fut}] \text{Mars be colonized}$
iff for some t' , $t < t'$, $M, t' \models \text{Mars be colonized}$.
- In speaking of this relation we put ourselves outside of time, where we can survey the entire timeline and inspect what happens to tenseless sentences at various instants.
- To put the semantics in time, we would need a tensed metalanguage.

- And that doesn't seem like a good idea.
- Suppose for the sake of argument that you could figure out how to formulate a reasonable theory of tense in a tensed metalanguage.
- Maybe it would have rules like
$$\text{Always}(M \models [\text{Pres}]\phi \text{ iff } [\text{Pres}](M \models \phi)).$$
- This isn't right, because we don't interpret present-tense sentences produced in the past this way.
- And using tense to explain tense isn't explanatory in the way that using a decontextualized framework to explain tense is explanatory.

McTaggart's Argument

- In 1909, the idealist philosopher John McTaggart published a famous argument purporting to show the unreality of time.
- If the argument were right, it would show that a decontextualized account of time is incoherent, or at least inadequate.

A-Series, B-Series

- The A-Series is perspective-dependent: 'today', 'last year'.
- The B-Series is perspective-independent: 'before', 'after'.

Initial Argument

- **Claim:** Change is impossible without the A-series. (Because change is a matter of present events becoming past.)
- **But the A-series is inconsistent,** because any given event is both past, present, and future.

Elaborated Argument

- **Objection:** There is no contradiction, because (for instance) a moment that *is* present *was* future and *will be* past.
- **Reply:** To say that an event will be past is to use tense. This is either circular or leads to a regress, when you try to explain the use of tense in ‘will be past’ you are invoking a secondary A-series.
- This regress looks like the Tarski hierarchy. Perhaps that regress is “vicious” if one is looking for a philosophical analysis. But it is not inconsistent, and a workable theory can be based on it.
- Whether or not McTaggart’s problem is a genuine philosophical problem, it doesn’t appear to be a problem for theories of tense based on tense logic, or for decontextualized theories of change.

McTaggart's Ghost

- The claim that you can't account for change without bringing in a temporal perspective is part of McTaggart's argument.
- Does this show up as a problem in linguistic semantics?
- Maybe, in the interaction of propositional attitudes and tense.
- Arthur Prior raises the puzzle of someone who, "in a dateless haze," says on June 15, 1954, "Thank goodness that's over!"
- That is not at all the same as saying "Thank goodness that's before June 15, 1954!"

The Technical Problem

- Consider “At time t , Agent A thinks that event e is over with.”
- This is a relation between A , t , and (according to the possible worlds account) a set of worlds.
- Models are now equipped with worlds as well as times. Think of a world as containing a history. The satisfaction relation is $M, w, t \models \phi$.
- The relevant set of worlds is the set of w such that e occurs before t in w .
- If $t = \text{June 15, 1954}$, then this is the same as the set of w such that e occurs before June 15, 1954 in w .
- Oops.

Centered Worlds Provide a Technical Solution

- As an aside, Reichenbach's token-reflexive account of indexicals like 'now' doesn't provide an entirely satisfactory solution.
- David Lewis (who attributed the idea to Quine) has a better solution: enrich the notion of a possible world.
- A (temporally) *centered world* is an ordered pair $\langle w, t \rangle$ consisting of a world and a time. This adds a temporal perspective to the world.
- If propositional attitudes now are sets of centered worlds, the problem disappears.

- Suppose that A thinks it's June 14, rather than June 15. Then the centered worlds compatible with A's beliefs will all share the date June 14.
- The belief on June 15 that E is over will consist of centered worlds $\langle w, \text{June 14} \rangle$ where E is before June 14 in w.
- This is not the same as the proposition that E occurs before June 15.
- That proposition is the set of centered worlds $\langle w, t \rangle$ where E occurs before June 15 in w.

Return to McTaggart's Challenge

- A premise of McTaggart's argument: a theory that is not embedded in a temporal perspective can't account for change.
- This would apply not only to tense logic and formal semantics, but to physical theories.
- This may not be a problem for physical theories ("If you have prediction, who needs change?") but natural language do have ways of talking about change, and formal semantics must take this into account.
- In English and similar languages, change is managed not in the tense, but in the aspectual+adverbial systems.

In Fact, Aspect Turned out to be a Problem

- Unlike tense, there were no readily available logical theories to apply to aspect.
- And Montague's attempts to use possible worlds semantics for progressive aspect led to the "imperfective paradox:" 'Jack is building a house' implies 'Jack will have built a house'.
- Other attempts to fix this within the context of possible worlds can solve the imperfective paradox, but haven't been successful in other respects. [Personal opinion.]

Adding Eventualities Can Help

- A more promising idea was first proposed by Terry Parsons: using events as the basis of a theory of aspect.
- Earlier, in a famous 1967 paper, Donald Davidson proposed introducing events into “logical form.”
- Davidson had in mind the interpretation of adverbs, but the interpretation of aspect is even more compelling. (And the motivation is linguistic, not philosophical.)

- Plausible axioms for events can enable you to construct moments from events, in much the same way that they can be constructed from Dedekind cuts of rational intervals. (But events are not the same as intervals.)
- This idea goes back to Bertrand Russell, though the technical details were worked out later.

- Davidson's suggestion for introducing events into "logical form," which for our purposes would be a level of syntactic representation, amounts to adding an extra argument place to the logical representation of a verb— $walk(x, e)$ rather than $walk(x)$ —and existentially quantifying the event position in base sentences involving these verbs— $\exists e walk(Jane, e)$ rather than $walk(Jane)$.
- This is still close to the standard way of doing this.
- [Personal opinion] Maybe dynamic logic provides a better method of managing event references.

Eventualities and Event Structure

- The term ‘eventuality’ is more general than ‘event’ and allows for different event-types, including processes and states.
- Ideas about aspect going back to Anthony Kenny and Zeno Vendler (and eventually, to Aristotle) are based on the thought that aspect is sensitive to event-type.
- The reason, for instance, that ‘She was swimming’ implies that she swam, while ‘She is swimming to France’ doesn’t imply that she will swam to France, has to do with the fact that swimming is a process, whereas swimming to France is a telic eventuality.
- In an influential paper published in 1988, Marc Moens and Mark Steedman proposed that telic eventualities are combinations of processes and culminating states.

Piecemeal Semantics

- Natural languages exhibit complex syntactic structures, as well as lexical processes and complex patterns for nuclear clauses centered on a single verb.
- Compare

Every ballerina who attended the dance was escorted by an officer who adored her.

and

By midnight, she will have been danced herself tired.
- The first invites a model-theoretic approach, based on compositional rules—Montague showed how to make this idea work for an impressive “fragment” of English.

- The second suggests a project of explaining a large, but finite number of syntactic patterns in terms of semantic patterns. (Of course, the more systematic and well organized these patterns, the better.)
- To some extent, the rules are compositional, but may involve defaults and coercion.
- An attempt to explain aspect has to integrate the semantic phenomena with a broad range of evidence, involving tense, time adverbials, agency and thematic structure, causative constructions, and interactions with the mass/count distinction.

- Resolving the two approaches—that is, integrating the semantic theories that seem most natural for multi-clause syntactic complexity and for single-clause lexical complexity—is not easy.
- David Dowty attempted this in *Word Meaning in Montague Grammar*, but this attempt didn't use events and event structure, and was inadequate in some details.
- I don't know of any successful integration of the two approaches, but hopefully a satisfactory integration isn't impossible.

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Back to the Philosophical Issue

- Whether we have a temporal ontology of instantaneous moments as in classical tense logic, or an ontology of eventualities, our theory of time is decontextualized: it adopts a timeless perspective, rather than situating itself in time.
- The philosophical question, then, would be: what remains of McTaggart's claim that a decontextualized approach to time can't account for change?

- It seems to me that McTaggart's claim loses much, if not all of its force if eventualities are the basic elements of time.
 - If you are inside an ongoing process, there will be an experience of change.
 - If you are surveying it from a timeless perspective, change will still be there, in differences between the temporally arranged parts of the event.

- As long as the point of the theory is not to exhibit the experience of change, but to understand change, it's hard to see what is missing. Perhaps there is no philosophical analysis of change, but this is not the point of linguistic semantics.
- What about the experience of change? Well, how to do this is up to psychologists, But at least, as we argued, the interaction between time and propositional attitudes can be done with a perspective-independent theory.

Possible Worlds and Intensionality

Possible Worlds Are Not Confined to Philosophy and Semantics

- Under other names ('states', for instance) they're used in probability theory, physics, economics, and other sciences.
- Possible worlds initially were used in philosophical logic for necessity and was later extended to other modalities.
- Later, Jaakko Hintikka proposed using them for propositional attitudes.
- Finally, in a technical *tour de force*, Montague showed how incorporating them into type theory could account for things like 'Jill imagines three unicorns' and 'Jack tries to catch several fish and eat them'.

Philosophy of Intensionality

- It was partly because of this result that Montague thought of himself as providing a rigorous basis for philosophy.
- After all, the problem of conceivable but nonexistent objects is one of the most persistent philosophical issues.
- Naturally, philosophers haven't leaped to embrace Montague's solution.

- There are residual problems like “Hob-Nob” sentences.
Hob thinks a witch has blighted Bob’s mare
and Nob thinks she killed Cob’s sow.
- But mostly the problem is that philosophers can’t agree on the foundational issues concerning apparent reference to nonexistents.
- Some philosophical positions—those that attempt to situate these references in an ontology of some sort—might be incorporated in formal semantics.
- Other positions—especially those that attempt to situate them in psychology—seem to be incompatible with formal semantics as it is now practiced by linguists.
- This aspect of intensionality seems to be an area where the proper and useful relations of philosophy and formal semantics haven’t been worked out.

An Issue that is Both Technical and Philosophical

- This is the theoretical adequacy of identifying the objects of propositional attitudes with sets of possible worlds.
- My own (fairly uncontroversial) opinion: it's a useful first approximation. But (more controversial) there is no really satisfactory solution to the problem of logical omniscience.
- A technical result: you can preserve the important features of Montague semantics and avoid logical omniscience if you're willing to take propositions to be primitive. (Most theorists find that unwelcome.)
- The best survey I know about this topic is Joseph Halpern and Riccardo Pucella, "Dealing with Logical Omniscience: Expressiveness and Pragmatics," *Artificial Intelligence* (2011), vol. 175, pp. 220–235.

Conditionals

- One of the most successful uses of possible worlds has to do with conditionals.
- The idea is that ‘If ϕ then ψ ’ is true at w iff ψ is true at the relevantly closest worlds to w , and the leading theories are due independently to Robert Stalnaker and David Lewis.
- Angelika Kratzer later worked this out as a linguistic theory, following ideas of Lewis’.
- This is a classic case of transfer of ideas from philosophy to linguistic semantics.

Controversial Issues about Conditionals

- One closest world or many? This is the issue of *conditional excluded middle*.
- Is the difference between indicative and subjunctive conditionals semantic or pragmatic?
- How best to account for the interaction of conditionals with modals?
- How to evaluate recent dynamic proposals about the interpretation of conditionals?