Formale Semantik 09. Tempus und Modalität

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Achtung: Folien in Überarbeitung. Englische Teile sind noch von 2007! Stets aktuelle Fassungen: https://github.com/rsling/VL-Semantik

Inhalt

- 1 Tense
 - Priorian operators
 - Tense raising
 - InterpretationSome problems
- 2 Modality
 - Realizations of modality

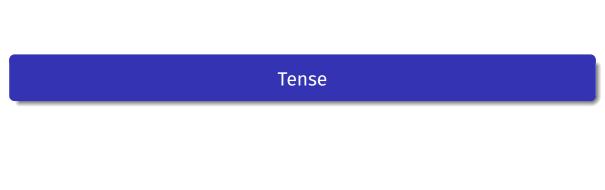
- Types of modality
- Modeling the background
- 3

Embedding

- Syntax
- Believe semantics
- Ambiguities
- Infinitives and gerunds

Targets for this week

- Understand how simple tense logic can be represented by operators shifting i indices.
- See why tense operators are sentence operators.
- See why a multi-dimensional theory of tenses and a better handling of tense embedding are required.
- See how we restrict (different types of) propositional backgrounds.
- Understand how opaque contexts affect meaning (incl. believe type verbs).
- Get a first idea of why we need the up operator ^.



Will, was... and always

- present: no operator (ϕ 'it is the case that ϕ ')
- past: P (P ϕ 'it was the case that ϕ ')
- future: **F** (**F** ϕ 'it will be the case that ϕ ')
- it will always be the case... ($\mathbf{G} = \neg \mathbf{F} \neg \phi$)
- it was always the case... ($\mathbf{H} = \neg \mathbf{P} \neg \phi$)

Evaluation

- PD(a) 'Arno Schmidt (has?) died.'
- relative to the current $\langle w, i \rangle$: $[PD(a)]^{\mathcal{M}, w, i, g}$
- ...is true iff there is some i', $\langle i', i \rangle \in \langle$ and
- $[\![\mathbf{PD}(\mathbf{a})]\!]^{\mathcal{M},\mathbf{w},\mathbf{i}',\mathbf{g}} = 1$

Like it or not...

- tense operators (TOp) are sentence (wff) Op's
- raise it to sentence-scopal position
- TP/IP position is motivated by copular/auxiliary elements
- He is stupid. vs. Kare-wa bakarashi-i.
- He was stupid. vs. Kare-wa bakarashi-katta.
- What_i **did** you expect t_i? vs. Nani-o yokishi-**ta**-ka.

New ps rules

- $T' \rightarrow TVP$ (adds tense to VP)
- $TP \rightarrow NP T'$
- TP \rightarrow TP conj TP
- $\bullet \ \, \mathsf{TP} \to \mathsf{neg} \,\, \mathsf{TP}$
- $[TP NP T VP] \Rightarrow [TP T NP VP]$ (T raising)

Quantification over instants

- $\llbracket \mathbf{P}TP \rrbracket^{\mathcal{M}, \mathbf{w}, i, g} = 1$
- iff among all $\langle i_n, i \rangle \in \langle$
- there is at least one s.t. $\llbracket \mathit{TP} \rrbracket^{\mathcal{M}, \mathsf{w}, \mathsf{i}', g} = 1$

Valuations as in Chierchia's M₃

- U: domain of quantification
- $V(\beta)$: non-relativized function for all β which are not a proper name
- $V(\beta)(\langle w,i\rangle)$: V valuates β to a function from world-time pairs to the denotata of the predicate (sets of individuals, tuples of them, etc.)

Natural tenses

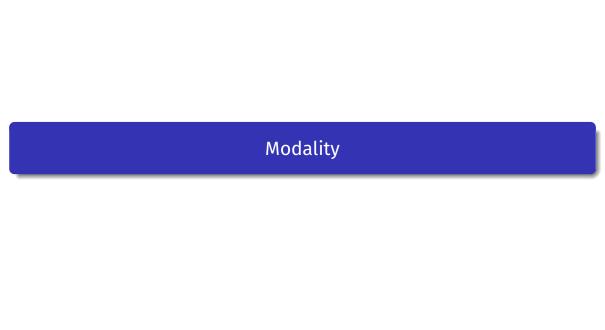
- NL tenses beyond TOp's:
- Arno Schmidt had already read Poe when he started writing 'Zettels Traum'.
- Gosh, I forgot to feed the cat.
- shifts of evaluation time

Reichenbach

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	*er würde gehen		

Embedded tenses and adverbials

- A man was born who will be king.
- P(a man is born F(who be king))?
- Yesterday, Maria woke up happy.
- Y(P(Maria wake up happy)) ?



Types of modal expressions

- tense forms: I eat up to 100 nachos a minute.
- mood: Responderet alius minus sapienter.
- modal auxiliaries: Herr Webelhuth can look like Michael Moore.
- adverbs: Maybe Herr Keydana will show up.
- affixes: Frau Eckardt is recognizable.

The logical form of modal operators

- like tense: sentence operators
- modal Aux in English is tense-insensitive (evidence for Infl)
- ullet and \Diamond in intensional predicate calculi (IPC): exploit the full set of possible worlds
- in NL: evaluation of modal expressions against restricted conversational backgrounds

The background

- different sets of possible worlds under consideration for different types of modal expressions
- different types of modality: different sets of admitted possible worlds
- we call the conversationally relevant background the set of $\langle w, i \rangle$ pairs relevant to the interpretation of the sentence

Root/Logical modality

- Agent Cooper cannot solve the mystery.
- translated into root modal IPC: $\neg \lozenge S(c, m)$
- wrong interpretation: Under no possible circumstances can Cooper solve the mystery.
- usually, some obvious facts constitute the background:
 - he could, but some relevant information is missing
 - he could, but is sick
 - he could, but ...

Epistemic modality

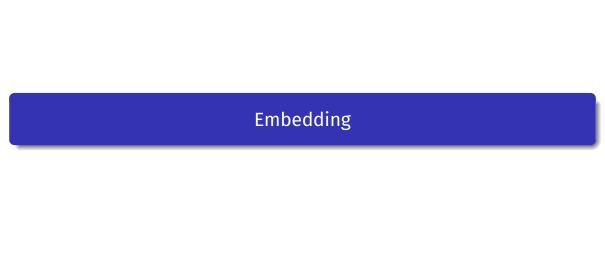
- Leo Johnson must be the murderer of Laura Palmer.
- in accordance with the known facts (e.g., in episode 7 of Twin Peaks):
 - ▶ Leo Johnson is a violent person.
 - Leo smuggles cocaine, Laura was addicted to it.
 - ► Leo is connected to Jacques Renault who is the bartender of *One Eyed Jack's* where Laura worked as a prostitute.
 - **...**
- which constitute the epistemic background, the sentence is true
- known facts narrow down the root background

Deontic modality

- Agent Cooper must not solve the mystery.
- assume:
 - there is some U.S. law which allows a local sheriff to ask the FBI to keep out of local murder investigations
 - ▶ Sheriff Truman has asked the FBI headquarters to keep out of the Palmer investigation
 - as a special agent, Cooper is required to obey Bureau policy
- Deontic backgrounds are narrowed down by normative rules and moral ideals.
- statable in propositional form (ten commandments, law, ...)

Sets of propositions

- specify the kind of background against which you evaluate under the given situation
- we need: a function from $\langle w, i \rangle$ to the relevant background set of $\langle w_n, i_m \rangle$
- reuse g: $g(\langle w, i \rangle) = \{p_1, p_2, \dots, p_n\} = \{\langle w, i \rangle_1, \langle w, i \rangle_2, \dots, \langle w, i \rangle_n\}$
- such that all possible worlds are: $\bigcap g(\langle w, i \rangle)$



CP structures: that

- that is a complementizer, it turns a sentence into an argument.
- ps rule: $CP \rightarrow CIP$
- [IP Racine believes [CP that [IP theatre rules]]]
- CP (fully fledged sentence) receives theta role by believe under government.

Weak Infl and PRO

- gerunds:
 [IP Stockhausen has plans [IP to write another 29 hour opera]]
- incomplete embedded IP, no subject
- internal theta role of has plans: to IP
- external theta role of write: to?
- PRO, controlled by the subject of has plans:
 [IP Stockhausen has plans [IP PRO to write another 29 hour opera]]

Propositional attitudes

- verbs like believe: propositional attitude verbs
- content of the believe: a pice of information held to be true by the believer, hence a proposition, a $\langle w_n, i_m \rangle$
- signalling one element in the background assumed by the believer
- belief: $\langle w, i \rangle$ is an element of the proposition of CP

Translating that as^

- value of propositional attitude (PA) verbs: functions $[\langle w, i \rangle \to \langle u_n, p \rangle]$ with $u_n \in U$, p a proposition (set of $\langle w_n, i_m \rangle$) and compatible to u_n 's background
- $up(\hat{\chi})$: an operator which gives the intension of an expression χ
- the full logic of ^ and ~ as designed by Montague next week
- rids us of the problem that the belief content looks truth-conditional (a sentence) but doesn't contribute to the embedding sentence's truth-value. PA verbs take intensions as arguments.

Meet B.J. Ortcutt

- Quine's story: Ralph knows...
- Bernard J.Ortcutt, the nice guy on the beach.
- He sees a strange guy with a hat in the dark alley a spy?
- Ortcutt just likes to behave funny on the way to his pub...
- and actually is sinister guy in the alley!
- Only Ralph doesn't know.

Is Ralph insane?

- What's the truth value of...
- Ralph believes that the guy from the beach is a spy.
- true: since Ortcutt and the guy in the hat are one individual
- false: since Ralph doesn't know that and in a way 'doesn't believe it'

de dicto and de re

- the Russelian interpretation for *the* like \exists with a uniqueness condition (as a GQ): $\lambda Q \lambda P [\exists x [Q(x) \wedge P(x)] \wedge \forall y [Q(y) \leftrightarrow y = x]]$
- in a raising framework: ambiguity between THE and believe
- $[_{IP}$ the guy from the beach, $[_{IP}$ Ralph believes $[_{CP}$ that x_i is a spy]]]
- makes the sentence true: the de re reading
- Ralph believes [CP that [P the guy from the beach; [P xi is a spy]]]
- makes the sentence false: the de dicto reading

Rigid designators

- Yuri Gagarin might now have been the first man in space.
- some Mickey Mouse LFs:
- \(\rightarrow \text{THE(first-man-in-space)(not-be-Gagarin)} \)
- at some $\langle w_n, i_m \rangle$ the first individual in space is not Y.G.
- THE(first-man-in-space)(\(\rightarrow [not-be-Gagarin] \right)
- at $\langle w, i \rangle$ the first individual in space (definitely Y.G.) is not Y.G. in an accessible world
- Names are rigid designators across world-time-pairs, definite descriptions aren't.

Chierchia's formalization

- CP has its own subject, to-IPs don't (PRO)
- PRO must be interpreted, in our examples by coindexation with the matrix subject
- infinitive embedding verbs: functions from world-time pairs to sets of individuals which have a certain property, the intension of a predicate^P
- John tries to sing.
- try(j, ^swim)

Literatur I

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