Dynamic Semantics (1) Introduction

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About this course

- introduction to **dynamic semantics**, which seeks to explicate the idea that saying something changes the context for what follows (in contrast to **static semantics**, which ignores context change, viewing it as irrelevant to truth conditions.)
- **core questions**
  - What kinds of phenomena in natural languages motivate dynamic semantics?
  - Based on cross-linguistic evidence, how should we implement the key concepts—esp. *information state*, *update*, *discourse referent*—to represent such phenomena?
- **topics**
  - M: Overview
  - T: Anaphora
  - W: Indexicality
  - Th: Temporality
  - F: Quantification
- **course page:** http://www.users.cloud9.net/~mbittner/nasslli-2016.html

1970s: Birth of *static semantics*

- Basic paradigm

  Montague Grammar (MG, Montague 1970, 1973)

  - directly compositional fragment of English, including proper and common nouns, (in)definite and quantificational determiners, pronouns, assorted verbs, tenses, conjunctions, complementizers, negation, …
  - formally explicit rules build English phrases (including sentences) and assign meaning representations in static *Intensional Logic* (which can represent context dependence, but not context change)

- **Basic ideas**

  - To know the meaning of a sentence is to know its truth conditions (paraphrase of Davidson 1967, p. 310)
  - "Syntax studies sentences, semantics studies propositions. Pragmatics is the study of linguistic acts and the contexts in which they are performed" (Stalnaker 1970, p. 275).

1970s: Applications of MG

Additional English phenomena analyzed, e.g. (non-exhaustive list):

- transformations: reflexive, passive, *tough*-movement, subject raising, object raising (Partee 1973)
- questions (Hamblin 1973, Karttunen 1977)
- tense and aspect (Bennet & Partee 1972, Bennet 1974, Dowty 1979)
- bare plurals, genericity (Carlson 1977)
- control verbs: *persuade*, *try*, *promise*, … (Bach 1979b)
- presupposition (Karttunen & Peters 1979)
- indexicality (Kaplan 1979: logical representation, compatible with compositionality)

1970s: Calls for theory of *context change*

- **presupposition projection** (Karttunen 1973, 1974), e.g.

  (1) #Sue passed. (presupposition failure)

  (2) Sue took a test and she passed.

  (3) If Sue took a test, she passed.

- **accommodation** (Lewis 1979)

  "If at time *t* something is said that requires presupposition *P* to be acceptable, if *P* is not presupposed just before *t*, then — *ceteris paribus* and within certain limits — presupposition *P* comes into existence at *t*."

  e.g.

  (4) I'm sorry I'm late. My car broke down.

  (✓accommodation: the speaker has a car)

  (5) I'm sorry I'm late. ?My space ship broke down.

  (?accommodation: the speaker has a space ship)

1970s: Calls for theory of *context change* (2)

- **assertion:** 'commonplace' v. 'essential' effect (Stalnaker 1978)

  "…when I speak I presuppose that others know I am speaking. […] This fact too can be exploited in the conversation, as when Daniels says **I am bald**, taking it for granted that his audience can figure out who is being said to be bald. I mention this commonplace way that assertions change the context in order to make clear that the context on which assertion has its essential effect is not defined by what it presupposed before the speaker begins to speak, but will include any information which the speaker assumes his audience can infer from the performance of the speech act."

1970s: Calls for theory of *context change* (3)

- **nominal reference** (Karttunen 1976)
  - "Consider a device designed to read a text in some natural language, interpret it, and store the content in some manner, say, for the purpose of being able to answer questions about it. To accomplish this task, the machine will have to […] be able to build a file that consists of records of all the individuals, that is, events, objects, etc., mentioned in the text and, for each individual, record whatever is said about it." (Karttunen 1976, p. 364)
  - "Let us say that the appearance of an indefinite noun phrase establishes a '<u>discourse referent</u>' just in case it justifies the occurrence of a coreferential pronoun or a definite noun phrase later in the text." (Karttunen 1976, p. 366, MB <u>emphasis</u>)

    (6) Al has <u>a dog</u>. <u>It</u>'s black.

    (7) Al doesn't have <u>a dog</u>. #<u>It</u>'s black.

    (8) It's not true that Al doesn't have <u>a dog</u>. <u>It</u>'s black.

    (9) Al is a <u>dog</u> owner. #<u>It</u>'s black.

    (10) Once upon a time, <u>a witch</u> had <u>a dog</u>. <u>It</u> was black and <u>it</u> had magical powers.

1970s: Calls for theory of *context change* (4)

- **centering** (Lewis 1979)
  - "It is not true that a definite description "the *F*" denotes *x* if and only if *x* is the one and only *F* in existence. Neither is it true that "the *F*" denotes *x* if and only if *x* is the one and only *F* in some contextually determined domain of discourse." (Lewis 1979 p. 348, see e.g. McCawley's (11))

    (11) The dog got in a fight with another dog.

  - "The proper treatment of descriptions must be more like this: "the *F*" denotes *x* if and only if *x* is the most salient *F* in the domain of discourse, according to some contextually determined salience ranking. […] There are various ways for something to gain salience. Some have to do with the course of conversation, others do not." (Lewis 1979, p. 348, see e.g. Lewis's (12))

    (12) The cat is in the carton. The cat will never meet our other cat, because our other cat lives in New Zealand. Our New Zealand cat lives with the Cresswells. And there he'll stay, because Miriam would be sad if the cat went away.

1970s: Calls for theory of *context change* (5)

- **temporal reference** (Kamp 1979)
  - French Passé Simple v. Imparfait ~ English Simple Past (13) v. Progressive (14):

    (13) John looked at Ann. She smiled. ~ Passé Simple

    (14) John looked at Ann. She was smiling. ~ Imparfait
  - "The claim I wish to make is that what distinguishes Imparfait and Passé Simple does not so much lie in the contribution they make to the truth conditions of the sentences in which they occur, but rather in the different directives they convey to the addressee concerning how he is to represent to himself the contents of the sentences which these tenses mark." (Kamp 1979, p. 401)
  - Kamp proposes that:
    - Passé Simple introduces a *point event* after or before the last mentioned event (temporal progression)
    - Imparfait introduces a *state* that holds at the time of last mentioned event (elaboration)

1980s: *Crosslinguistic* static semantics

- **Kalaallisut** (Eskimo-Aleut: Greenland)

  polysynthetic, ergative, both passive and antipassive constructions, no (in)definite articles, no scope ambiguities (Bittner 1988)

- **Japanese** (lg. isolate: Japan)

  temporal reference in complex sentences, no sequence of tense (Ogihara 1989)

- (many more developments in 1990s and 2000s)

1980s: Birth of *dynamic semantics*

- Basic paradigm
  - **Discourse Representation Theory** (DRT)
    - temporal reference (Kamp 1981a), indefinites & anaphora (Kamp 1981b)
    - In DRT,

      a *discourse referent* (*dref*) is a variable,

      an *info-state* is a Discourse Representation Structure (DRS)

      update is a relation between DRSs
  - **File Change Semantics** (FCS)
    - (in)definiteness and anaphora (Heim 1982), presupposition projection (Heim1983)
    - In FCS,

      a *dref* is a variable,

      an *info-state* is a file,

      update is a function from file to file

1980s: Birth of *dynamic semantics* (2)

- **Basic ideas**
  - "You know the meaning of a sentence if you know the change it brings about in the information state of anyone who accepts the news conveyed by it" (Veltman 1990, p. 1)
  - Context change is interleaved with context dependence (e.g. anaphora in (17)–(19)) and thereby, crucially bears on the truth conditions.

  e.g.

  (17) A man married a woman. He gave her a ring.

  (18) When a man marries a woman, he gives her a ring.

  (19) When a man marries a woman, he {usually, never, sometimes} gives her a ring.

1990s: Relation to standard logics

DRT-style logics

Dynamic Predicate Logic (DPL)

- Groenendijk & Stokhof (1991)
- deviation from *Predicate Logic*
  (same syntax, different semantics)
- in DPL representations,
  drefs (*d*iscourse *ref*erents) are variables
  info-state is an assignment
  update relation between info-states
- phenomena analyzed
  DPL analysis of *indefinites* & *anaphora*
  ~ DRT analysis in Kamp 1981b

FCS-style logics

Update Semantics (US)

- Veltman (1990, 1996)
- deviation from *Propositional Logic*
  (same syntax, different semantics)
- in US representations,
  there are no individual-valued *drefs*
  info-state is a set of worlds
  update function fr info-state to info-state
- phenomena analyzed
  epistemic modals (e.g. It might rain),
  default reasoning

1990s: Relation to standard logics (2)

DRT-style logics

Dynamic Plural Logic (DPlL)

- van den Berg (1993, 1994)
- deviation from, and extension of *DPL* (extended syntax, different semantics)
- in DPlL representations,
  drefs are variables
  info-state is a set of assignments
  update relation between info-states
- phenomena analyzed
  plurality, *quantification* & *anaphora*, e.g.

  (20) Al invited some friends. Most people came, and they all had a good time. One girl had a prior engagement.

FCS-style logics

Kinematic Predicate Logic (KPL)

- Beaver (1992)
- combines *US* with *DPL*
- in KPL representations,
  drefs are variables
  info-state is a set of world-assign. pairs
  update function fr info-state to info-state
- phenomena analyzed
  quantification & *presupposition*, e.g.

  (21) No nation cherishes its king.

  (22) A fat man was pushing his bicycle.

1990s: *Compositional* dynamic semantics

DRT-style logics

Compositional DRT (CDRT)

- Muskens (1995, 1996)
- DPL embedded in *Type Logic*

- objects — CDRT type
  - *individuals* — δ
  - *info-states* — s (‘***assignment***’)
  - *individual-drefs* — $s\delta$
  - *update* ***relations*** — sst
- applications
  type-driven compositional analysis of *nominal reference* (Muskens 1996), *temporal reference* (Muskens 1995)

FCS-style logics

Predicate Logic with Anaphora (PLA)

- Dekker (1994, 2002)
- PL with sequence-based anaphora, can be embedded in *Type Logic* (CPLA)
- objects — CPLA type
  - *individuals* — δ
  - ***sequences*** — s
  - *individual-drefs* — $s\delta$ (***projection fnc***.)
  - *update* ***functions*** — $(st)st$
- applications
  PLA analysis of *indefinites* & *anaphora*
  ~ DRT analysis of Kamp 1981b
  (compositional implementation in CPLA)

1990s: Compositional applications

Additional phenomena analyzed compositionally in typed dynamic logics, e.g.

- *modals & conditionals* as modal reference (Stone 1997, applying Muskens 1995)

  (23) a. Pedro owns a donkey. He beats it.

  b. If the railroads merged, the line would face bankruptcy.

  (24) a. Pedro owns a donkey. #She beats it.

  b. #If the railroads merged, the line will face bankruptcy.

- '*sloppy identity*' as center-sensitive anaphora with center-shift (Stone & Hardt 1999, applying Muskens 1995)

  (25) a. Susan likes her cat. Jane does too. (= loves the central individual's cat)

  b. John will use slides if he presents. Bill will just use the chalkboard (= will if the central individual presents).

- *resultatives* as centering- and aspect-sensitive type lifting (Bittner 1999, applying Dekker 1994 and Muskens 1995)

  (26) a. John shot Ann dead.

  b. John wiped [[few tables clean] and [no glasses completely dry]]

2000s: *Crosslinguistic* dynamic semantics

DRT-style logics

Plural CDRT (PCDRT)

- Brasoveanu (2007ff)
- *DPIL* embedded in *Type Logic*, extensions with other types of drefs

- e.g.

objects	PCDRT type
individuals, *events*, …	$\delta, \varepsilon, \ldots$
'assignments'	s
drefs	$s\delta, s\varepsilon, \ldots$
(pl.) info-states	st
update ***relations***	$(st)(st)t$

FCS-style logics

Update with Centering (UC)

- Bittner (2001ff)
- *PLA* with *centering-based anaphora* (to drefs in center v. background of attention) embedded in *Type Logic,* extensions with other types of drefs

- e.g.

objects	UC type
individuals, *events*, …	$\delta, \varepsilon, \ldots$
structured sequences	s
drefs	$s\delta, s\varepsilon, \ldots$
(pl.) info-states	st
update ***functions***	$(st)st$

2000s: Sample applications of PCDRT

- English **quantificational and modal subordination** as structured anaphora to quantifier domains (Brasoveanu 2007)

  (27) a. Harvey courts a girl at every convention. She always comes to the banquet with him. (Karttunen 1976)

  b. A wolf might come in. It would attack Harvey first. (Roberts 1987)

- **Comparative correlatives** (e.g. Romanian 'the more … the better') as structured anaphora to differentials (Brasoveanu 2008)

- **Dependent indefinites** (e.g. English The kids got an apple each) as structured discourse reference (Henderson 2014)

2000s: Sample applications of UC

- **modification in polysynthetic Kalaallisut** as *background-elaboration* sequencing, where parts of Kalaallisut words introduce background drefs of various types, which external modifiers (MOD) can elaborate (Bittner 2001a)

  (28) Sukkasuu-mik qiturna-n-nik anura-liu-us-si-vu-nga nutaa-mik.
  quick-MOD child-1SG-MOD anorak-make-for-antip-DEC-1SG new-MOD
  I quickly made a new anorack for my child.

- Warlpiri and Hindi **correlatives** as *topic-comment* sequencing, where the topic is a topical dref (i.e. top-ranked in the center of attention) for an individual, proposition, or other type of object (Bittner 2001b)

- **Cheyenne evidentials** as not-at-issue content; comparison with English evidential parentheticals (Murray 2010, 2014)

- **grammatical categories** (tense, aspect, mood, person) as *centering systems*, i.e. grammatical systems that keep track of top-ranked drefs (universal proposal based on English, Polish, Mandarin, and Kalaallisut) (Bittner 2014)

Tomorrow: Anaphora

- **Basic ideas**
  - Cross-linguistic evidence shows that *default anaphors* (e.g. English pronouns, Kalaallisut pronominal inflections, Mandarin 'zero anaphors') refer to *top-ranked* individuals (Kalaallisut, Mandarin) or are *shallow anaphors* (English), which can also refer *just demoted* individuals.
  - Simple Update with Centering (UC_0) for representing centering-based anaphora
- **Suggested readings**
  - Dekker, P. 1994. Predicate Logic with Anaphora. *SALT IV: Proceedings from Semantics and Linguistic Theory IV*, pp. 79–95.
  - Grosz, B. Joshi, A., and Weinstein, S. 1995. Centering: A framework for modelling the local coherence of discourse. *Computational Linguistics* 12:175–204.
  - Kehler, A. 1997. Current theories of centering for pronoun interpretation. A critical evaluation. *Computational Linguistics* 23:467–475.

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