Explaining anaphoric accessibility: Navigating non-veridical environments in dynamic semantics

Patrick D. Elliott & Lisa Hofmann
ESSLLI course proposal

1 Personal Information

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2 General Information

Title:	Explaining anaphoric accessibility: Navigating non-veridical environments in dynamic semantics
Category:	Language & Logic
Type:	Advanced course
Duration:	1 week

3 Abstract

Classical dynamic accounts of anaphora rely on logical operators arbitrarily manipulating anaphoric information. Alongside conceptual concerns of explanatory (in)adequacy, classical accounts are known to make poor empirical predictions for non-veridical environments (see, e.g., Roberts 1987, Krahmer and Muskens 1995). In this course, we motivate an alternative approach, which treats logical operators as fundamentally truth-functional. In the first half of the course, we explore an approach to anaphora based on the Strong Kleene account of presupposition projection. The initial goal will be to derive and improve upon Groenendijk and Stokhof's (1991) accessibility generalizations, with a particular focus on negation and disjunction. The latter half of the course zooms in on *counterfactual* content: The initial Strong Kleene account fails to capture key constraints on the (anti)veridicality of anaphorically active content. We revise the account by *intensionalizing* discourse referents, which are in turn interpreted relative to both a local and a global intensional context.

4 Motivation & Description

In the proposed course, we would like to explore what ingredients are necessary for an explanatory account of anaphoric accessibility — one that can explain the discourse effect of sentential operators on the basis of their truth-functional properties, and extend the empirical coverage of first-generation dynamic semantics to anaphoric dependencies in non-veridical environments.

Non-veridical operators, like modals or negation, constrain anaphora. This is demonstrated by the generalization that indefinites in non-veridical contexts often don't provide antecedents for anaphora (1b) & (1c), while those in veridical contexts do (1a) (Karttunen, 1976).

(1) Antecedent context constrains anaphora:
   a. *Mary has [a car]^1. It$_1$ is parked outside.*
   b. *Mary might have [a car]^2. #It$_2$ is parked outside.*
   c. *Mary doesn't have [a car]^3. #It$_3$ is parked outside.*

Classical dynamic frameworks (Kamp, 1981; Heim, 1982; Groenendijk and Stokhof, 1991) examine how constraints on anaphoric accessibility work within a nested update system. Asserting a simple existential statement involving an indefinite (e.g. "Mary has a car") updates the discourse context to include a discourse referent pointing to a car of Mary's, allowing subsequent anaphora to be interpreted as variables with the same reference. Modalized or negated content, however, specifies a hypothetical local update and a condition on the global context (i.e., the update is possible or impossible) without actually adding the update. These dynamic systems explain the contrast in (1) by positing nested discourse updates and structural accessibility relations.

Since the inception of dynamic approaches to discourse interpretation, it's been recognized that there is a conceptual issue with such nested update systems. In order to capture generalizations about anaphoric accessibility, nested update systems such as Heim's treat sentential operators as functions over *Context Change Potentials*. This is a significant departure from the classical, truth-functional treatment of the logical operators. The impact of an operator on the context change potential of anaphorically active embedded content is determined on a by-operator basis: Some allow the embedded dynamic content to be interpreted globally, while others do not.

The main challenge is that there is no obvious way of deriving a Heimian semantics for the logical operators based solely on their truth-functional import. This issue has mainly been discussed in the domain of presupposition projection (see, e.g., Schlenker, 2008, 2009; George, 2008, 2014). Subsequently, alternative accounts of presupposition projection have been developed, which broadly retain the same empirical coverage, while also preserving a classical semantics for logical operators. Although alternatives to dynamic semantics have been developed specifically for donkey anaphora (see, e.g., Heim, 1990), dynamic approaches are still the dominant approach for discourse anaphora (see Mandelkern and Rothschild 2020 for relevant discussion).

On the empirical side, dynamic systems with nested update predict that content within the scope of non-veridical operators should be anaphorically inactive, but many counterexamples have been found. These include (2a) double negation (Karttunen, 1976; Groenendijk and Stokhof, 1991), (2b) so-called 'bathroom disjunctions',[1] (2c) modal subordination (Roberts, 1987), and (2d) inter-speaker disagreement (Hofmann, 2019, 2022).

(2) a. Double negation
       It's not true that Mary doesn't have a car. It is parked behind the building.
    b. Bathroom disjunctions
       Either Mary doesn't have a car, or it's parked behind the building.

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[1]Named after the famous example sentence in Roberts, 1987, where it is attributed to Barbara Partee.

    c.   Modal subordination
        Mary doesn't have a car. It would be parked behind the building.
    d.   Inter-speaker disagreement
        A: *Mary doesn't have a car.*
        B: *(What are you talking about?) It's parked behind the building.*

To learn which tools are needed to extend the empirical coverage of classic dynamic systems to handle anaphoric dependencies in non-veridical environments, and to derive the discourse effect of sentential operators on the basis of their truth-functional properties, our class proceeds in two steps:

In the first part of the course, we focus on the connection between presupposition projection and anaphora, and especially on the *non-classicality* of nested update systems. As has long been recognized in the dynamic literature, there is a tight connection between anaphoric accessibility and presupposition projection. Consider, for example, a presuppositional variant of a bathroom disjunction.

(3)   *Either Josie never started smoking, or she's planning to quit.*

Probably the simplest viable theory of presupposition projection on the market — trivalence with Strong Kleene projection — accounts for (3) straightforwardly. Our initial goal will be to extend the Strong Kleene account of presupposition projection to anaphoric accessibillity in a maximally conservative way. In order to derive this, we discuss ways of utilizing a Strong Kleene semantics for logical operators within a dynamic setting, building on work by Rothschild (2017); Elliott (2020). We'll demonstrate that a simple dynamic system with Strong Kleene projection at its core is *more classical* that nested update systems. Crucially, logical principles such as *Double Negation Elimination* and *De Morgan's equivalences* fall out automatically. At this stage, a generalization will emerge — our initial system will predict that anaphora to an indefinite NP is possible just in case a *witness* to the indefinite is contextually entailed (Mandelkern, 2022).

In the second half of the course, we'll focus on cases where this generalization breaks down, largely involving anaphora to *conterfactual* content. E.g. anaphora to counterfactual indefinites under negation are possible in cases of modal subordination, such as (4a), repeated below, as well as other cases of anaphora in counterfactual (4b) or non-veridical contents (4c).

(4)   *Mary doesn't have a car.*
    a.   *It would be parked behind the building.*
    b.   *Therefore, she doesn't need a place to park it.*
    c.   *Even though John thinks that he has seen it.*

Here, we need to consider the (im)possibilities which are contrary to the contextually introduced discourse information. We show that a necessary ingredient for accounting for such cases will be interpreting discourse referents relative to a world parameter (based on Carnap, 1947; Stone, 1999), in an intensional dynamic semantics. This will allow us to refine our previous generalization that the existence of a referent is contextually entailed by understanding it relative to local intensional contexts (Stone, 1999): The developed system predicts that anaphora to a DP is possible just in case a witness to the indefinite is entailed in each world of the local context of the anaphor. The resulting system is a flat-update dynamic semantics, where referential discourse information is always available on a global level, and in which discourse states store intensional information about drefs, about the worlds in which the variable has an existing referent.

5 Tentative schedule

Day 1 Background: dynamic semantics and discourse interpretation

Day 2 Negation and disjunction in dynamic semantics

Day 3 Anaphora and presupposition projection

Day 4 Anaphora to counterfactual content

Day 5 Discussion, open problems, etc.

6 Selected readings

6.1 Background: Dynamic Semantics and Discourse Interpretation

- Groenendijk and Stokhof (1991)
- Heim (1982)
- Heim (1983)
- Chierchia (1995)

6.2 Negation and Disjunction in Dynamic Semantics

- Stone (1999)
- Simons (1996)
- Krahmer and Muskens (1995)
- Gotham (2019)

6.3 Anaphora and Presupposition Projection

- Rothschild (2017)
- Mandelkern (2022)
- Elliott (2020)
- Elliott (2022)

6.4 Anaphora to Counterfactual Content

- Stone (1999)
- Kibble (1994)?
- Hofmann (2019)

6.5 Discussion, Additional Data

- Lewis (2021)

- Dekker and Van Rooij (1998)?

- times and event bridging

- discourse relations

- uniqueness and weak / strong readings

7 Information about Proposers and Course

7.1 Expected Level and Prerequisites

This course is intended as an advanced course for the *Language and Logic* track, aimed primarily at students with an existing background in formal semantics.

7.2 Appeal to Students outside of Main Discipline

The course is designed for students with a background in formal semantics and will also appeal to those with with strong background in logic, as the systems discussed in the course have distinct logical properties that set them apart from existing logics for handling anaphoric dependencies. Additionally, students with a background in NLP may also find it beneficial to learn about logical approaches to anaphoric dependencies, given the significant amount of research on anaphora resolution from a computational perspective. As formal semanticists with interest in computational and experimental approaches to linguistics, both instructors are committed to fostering interdisciplinary dialogue among linguists, philosophers of language, computer scientists, logicians, and psycholinguists.

7.3 Teaching Experience

Patrick Elliott has several years of experience teaching advanced, research-oriented semantics seminars. He spent three years as a visiting assistant professor at the Massachusetts Institute of Technology, where he taught topical semantics research seminars aimed at linguistics graduate students both as the sole instructor and together with senior faculty, consistently receiving excellent feedback in student evaluations. In Spring 2022, he taught a graduate-level seminar "Discourse referents inside and out", which covered some of the same topics as the current proposal. He has also taught the introductory semantics track at the *Advanced Core Training in Linguistics* summer school, held at University College London in 2018, as well as multiple courses at the 2018 EGG summer school, held in Banja Luka. He is currently teaching two advanced semantics seminars at the Heinrich-Heine University of Düsseldorf.

Lisa Hofmann has been teaching at the University of Stuttgart since February 2022, covering subjects in formal semantics, pragmatics, psycholinguistics, and sociolinguistics. She received training in academic teaching during her graduate studies at UC Santa Cruz, where she also served as a teaching assistant for five years, receiving consistently high student evaluations. Through this training, Lisa developed strong skills in creating effective teaching materials and presenting

problems and arguments in a clear and engaging manner. The proposed course aligns closely with Lisa's year-long research project on 'Anaphora and Negation,' which combines findings from her 2022 dissertation and a 2019 Amsterdam Colloquium contribution. Lisa has presented the topic and refined the narrative in various settings, including a seminar at Stuttgart University, a guest lecture at Oxford University, and research presentations at the Amsterdam Colloquium and several colloquia (e.g. at UC Berkeley, NYU, and HHU Düsseldorf).

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