1 Introduction

There is a contrast between positive and negative sentences licensing certain follow-ups.

(1) Polar additives (neither/so) [Klima (1964)]
   a. Mary slept.
      (i) So did Dalia.
      (ii) #Neither did Dalia.
   b. Mary didn’t sleep.
      (i) #So did Dalia.
      (ii) Neither did Dalia.

(2) Agreement with Polar response particles (PRPs) (yes/no) [Farkas and Bruce (2010); Roelofsen and Farkas (2015)]
   a. Mary slept.
      (i) Yes, she slept.
      (ii) #No, she slept.
   b. Mary didn’t sleep.
      (i) Yes, she didn’t sleep.
      (ii) No, she didn’t sleep.

Phenomenon tried to account for:
1. Polarity of sentences in discourse:
   Question: What makes a sentence positive/negative in discourse?
2. Cross-clausal anaphora sensitive to the polarity of the antecedent:
   Question: How can their polarity-sensitivity be accounted for?
   - Focus on Additive polarity tags (1), PRPs (2)

Polarity-sensitive anaphora (PSAs)
- Following assumptions of Krifka (2013); Roelofsen and Farkas (2015) for Polarity Particles:
  - Treating them as anaphoric to propositions

Discourse polarity
- Complex phenomenon influenced by syntactic, semantic, and pragmatic factors
- Not purely syntactic or not purely semantic
- Find a semantic level of representation:
  - Amenable to contextual manipulation, able to represent some structural syntactic information

Account of discourse polarity presented here:
- Dynamic semantics (Compositional Discourse Representation Theory, CDRT, cf. Muskens (1996)) with hyperintensionality (Thomason (1980))
  - Semantic representation that can be manipulated in context
  - Polarity for propositional discourse referents:
    - Underlying type logic: two sorted domain of propositions
    - Allows us to capture more surface restrictions, not allowing licensing by entailment
    - Gives a formal foundation to the [+/-] distinction for polarity of propositional anaphora in Roelofsen and Farkas (2015)
    - Captures non-licensing by entailment

Hyperintensionality (Thomason (1980))
- Standard conception of propositions: Sets of worlds
- Entailment is defined over sets of worlds
- Hyperintensionality makes connection between propositions and sets of worlds more indirect
- Introduce basic type of propositions p as primitive objects
- Now they don’t participate in entailment relations
- Propositions related to their truth-conditional content by content-function
- Thomason (1980) uses this for non-closure under entailment for complements of belief-statements

Coming up:
- Empirical background on sentential negativity
- A dynamic intensional system
- Going hyperintensional
- Discussion
2 Sentential Negativity

Discourse-negative sentences are syntactically and semantically heterogeneous (Klima (1964); Brasoveanu et al. (2014))

(3) Adverbs, subjects and objects:

a. A: Mary never exercises.
   B: ❌Me neither.

   B: ❌Me neither.

c. A: Mary called nobody.
   B: ❌Me neither.

(4) DE quantifiers:

a. A: Mary hardly exercises.
   B: ❌Me neither.

b. A: Few people like to exercise.
   B: ❌Me neither.

Discourse polarity is not purely syntactic

• Kroll (2016): Certain contexts license sluices that differ in polarity from their antecedent

• These contexts contextually introduce negativity

(5) Contextual introduction:

a. Neg-raising:
   I don’t think Mary exercises, ...
   ❌...and neither do I.
   ❌...No, she really doesn’t.

b. Accommodation under disjunction:
   Love yourself or...
   ❌...neither will anybody else.

• Shows that discourse polarity can be introduced non-overtly

Not purely semantic either

• Klima (1964): Negative PSAs are not licensed by entailment

(6) Non-licensing by lexical entailments:

A: Peter failed the test.
← Peter didn’t pass the test.
B: # Me neither. (I didn’t pass the test either)
# No, he didn’t. (As agreement)

• Not compatible with standard view of propositional drefs in terms of sets of worlds

• Roelofsen and Farkas (2015); Jackendoff (1969):
  A proposition/sentence is negative if negation is the highest-scoping operator
  – Some counterexamples to this semantic generalization

(7) a. High-scoping modals:
   A: I shouldn’t go alone.
   B: ❌Me neither.
   ❌No, you really shouldn’t.

b. Quantified pronouns:
   We all didn’t sleep.
   B: ❌Me neither.
   ❌No, you truly didn’t

Interim summary:

• Negativity may be introduced by a variety of linguistic devices
• Contextual introduction, but no licensing by entailment
• Has to be introduced linguistically
• May be outscoped

3 The account

1. Dynamic system with propositional drefs
2. Hyperintensionalize propositional anaphora

3.1 A dynamic intensional system

• CDRT with propositional discourse referents (Muskens (1996); Brasoveanu (2007, 2010))
  – Truth-conditions for negation and dynamics for propositional anaphors

• Assignment functions
  – Objects manipulated and updated in context
  – In classic static systems: Functions from variables to entities
  – Basic type s (discourse states)

• Discourse referents (drefs)
  – Functions from assignments to entities
Sentential Negativity and Polarity-Sensitive Anaphora

– Individual drefs: type se
  – Variables: \(v, v_1, v_2, \ldots\)
– Propositional drefs: type \(s(vt)\)
  – Variables: \(\phi, \phi_1, \phi_2, \ldots\)

• Sentence meanings
  – Conceptualized as their context-change potential
  – Binary relations between discourse states: Type \(s(st)\)
  – Dynamics: Updating variable assignments
  – Truth-conditions: Imposing conditions on output states

Positive vs. negative sentences

(8) a. Mary sleeps.
   b. \(\text{dec}(\text{Mary sleep}) \rightarrow \)
      \[
      \begin{array}{c}
      \phi, v \\
      v = \text{Mary}_e \\
      \text{sleep}_\phi[v]
      \end{array}
      \]
   • New drefs:
     – \(\text{DEC}: \phi\)
     – \(\text{Mary}: v\)
   • Truth-conditions:
     – \(\text{Mary}: v\) refers to \(\text{Mary}_e\)
     – Verb: \(v\) sleeps in \(\phi\)

(9) a. Mary doesn’t sleep.
   b. \(\text{dec}(\text{not}(\text{Mary sleep})) \rightarrow \)
      \[
      \begin{array}{c}
      \phi_1, \phi_2, v \\
      v = \text{Mary}_e \\
      \text{sleep}_{\phi_2}[v] \\
      \phi_1 \cap \phi_2 = \emptyset
      \end{array}
      \]
   • New drefs:
     – \(\text{DEC}: \text{Matrix } \phi_1\)
     – \(\text{NOT}: \text{Embedded } \phi_2\)
     – \(\text{Mary}: v\)
   • Truth-conditions:
     – \(\text{Mary}: v\) refers to \(\text{Mary}_e\)
     – Verb: \(v\) sleeps in \(\phi_2\)
     – \(\text{NOT}: \phi_1\) and \(\phi_2\) are disjoint

• So we have truth-conditions of negation + propositional drefs
• No distinction between positive and negative...
• ...yet

3.2 Hyperintensionality

• Hyperintensionality for polarity distinctions:

– Distinctions between positive and negative propositions that cannot be derived by entailment
– In the spirit of Thomason (1980), we add two basic static types for propositions
  – Positive and negative propositions \(p^+\) and \(p^-\)
– Level of type theory:
  Two-sorted domain of propositions: \(D_{p^+}, D_{p^-}\)
• Hyperintensional propositional drefs: \(s(p^+), s(p^-)\)
  – Variables:
    – Positive: \(\pi^+, \pi_1^+, \pi_2^+, \ldots\)
    – Negative: \(\pi^-, \pi_1^-, \pi_2^-, \ldots\)
    – Flexible: \(\pi, \pi_1, \pi_2, \ldots\)
– Captures polarity-sensitive propositional anaphora
– Rules out cases where they fail as type mismatch
• Content function
  – Hyperintensional propositions \((p^+, p^-)\) are related to their truth-conditional content by content function
  – \(\text{Cont}(p)\) for \(p \in \text{Term}_\sigma, \sigma \in \{p^+, p^-\}\)
  – Evoked by evaluation function for predicates

Positive sentences

(10) a. Mary sleeps.
   b. \(\text{dec}(\text{Mary sleep}) \rightarrow \)
      \[
      \begin{array}{c}
      \pi^+, v \\
      v = \text{Mary}_e \\
      \text{sleep}_{\pi^+}[v]
      \end{array}
      \]
   • New drefs:
     – \(\text{DEC}: \pi^+\)
     – \(\text{Mary}: v\)
   • Truth-conditions:
     – \(\text{Mary}: v\) refers to \(\text{Mary}_e\)
     – Verb: \(v\) sleeps in the content of \(\pi^+\)

• Intensional argument (providing worlds of evaluation) for the verb is a \(\pi^+\)
• Propositional dref introduced by \(\text{dec}\) could be positive or negative
• \(\text{dec}\) will introduce a propositional dref that can be an argument for the verb
• Type mismatch otherwise
### 3.3 Accounting for polar additives

- Not accounting for additive presupposition
  - Folded in to relation $\parallel(\pi_1, \pi_2)$
  - Satisfied if additive presupposition is satisfied

- Not accounting for (interaction with) VPE

The semantic contribution of polar additives

- $so$ combines with a sentence, and requires the proposition introduced by the sentence:
  - To be positive
  - To be parallel to a positive propositional antecedent ($\pi^+$) in the discourse

- $neither$ combines with a sentence
  - Negates it
  - Requires the proposition introduced by this new sentence
  - To be negative
  - To be parallel to a negative propositional antecedent ($\pi^-$) in the discourse

**How this works for neither**

#### (14) Mary didn’t sleep.

- $\parallel(\pi_1, \pi_2, u_1)$
  - $u_1 = Mary_e$
  - sleep$_\pi_2\{u_1\}$
  - $Cont[\pi_1] \cap Cont[\pi_2] = \emptyset$

#### (15) Neither did Dalia sleep.

- $\parallel(\pi_3, \pi_4, u_2)$
  - $u_2 = Dalia_e$
  - sleep$_\pi_4\{u_2\}$
  - $Cont[\pi_3] \cap Cont[\pi_4] = \emptyset$
  - $\parallel(\pi_3, \pi_5)"

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**Upshot**

- Positive/negative difference is conceptualized as type difference for propositional objects
- Type combinatorics of compositional semantic system make sure that propositional drefs introduced on matrix level are of the right type
- Infelicity of PSAs in the wrong context: No suitable antecedent available of the right type
The proposed account

- Fully formal account of positive and negative polarity for propositional drefs

- Introduces a level of representation that is sensitive to the right amount of syntactic structure but may be manipulated in context

- Antecedent for neither provided in context of (14)

- Accounts for
  - Non-licensing by entailment
  - Outscoped negation
  - Polarity-sensitivity of PSAs in terms of type-mismatch

- Does not account for
  - Contextually introduced negativity
  - Fine-grained generalizations about negativity introduced by weaker negative expressions

- Somewhat stipulative

- Future directions:
  - Capture finer-grained generalizations (weak negatives, outscoping, contextual factors)
  - Explore a way of utilizing the structure of the dynamic account to capture generalizations (negative subordination?)
  - More explanatory account of how the conditions on antecedents arise

4 Discussion and further directions

The proposed account

- Merging DRSs and resolving anaphor:
  \[
  \pi_1, \pi_2, v_1, \pi_3, \pi_4, v_2 \\
  v_1 = Mary_e \\
  \text{sleep}_{\pi_1} \{v_1\} \\
  \text{Cont}(\pi_1) \cap \text{Cont}(\pi_2) = \emptyset \\
  v_2 = Dalia_e \\
  \text{sleep}_{\pi_1} \{v_2\} \\
  \text{Cont}(\pi_3) \cap \text{Cont}(\pi_4) = \emptyset \\
  \text{parallel}(\pi_3, \pi_1)
  \]

- Antecedent for neither provided in context of (14)

- Neither in a positive context

(16) Mary slept: ~

\[
\pi_1, v_1 \\
 v_1 = Mary_e \\
 \text{sleep}_{\pi_1} \{v_1\} \\
 \text{Cont}(\pi_1) \cap \text{Cont}(\pi_2) = \emptyset \\
 \text{parallel}(\pi_2, \pi_1)
\]

(17) Mary slept:

- Same as above

- Crucially introducing \(\pi_1\), s.t. Mary slept in the context of \(\pi_1\)

(18) Neither did Dalia sleep.

\[
\pi_3, v_3, v_2 \\
 v_2 = Dalia_e \\
 \text{sleep}_{\pi_1} \{v_2\} \\
 \text{Cont}(\pi_3) \cap \text{Cont}(\pi_4) = \emptyset \\
 \text{parallel}(\pi_3, \pi_1)
\]

(19) Neither did Dalia:

- Anaphoric to negative \(\pi_4\)

- Needs an antecedent in discourse

- No suitable antecedent for \(\pi_4\)!

\[
\pi_1, v_1, \pi_2, \pi_3, v_2 \\
 v = Mary_e \\
 \text{sleep}_{\pi} \{v\} \\
 v_2 = Dalia_e \\
 \text{sleep}_{\pi} \{v_2\} \\
 \text{Cont}(\pi_2) \cap \text{Cont}(\pi_3) = \emptyset \\
 \text{parallel}(\pi_3, \pi_1)
\]

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