Lecture 6: Bidirectional OT and Pragmatics

1 Overview

♦ The Tradition of Radical Pragmatics

Division of labour between semantics and pragmatics

“Radical pragmatics is the hypothesis that many linguistic phenomena which had previously been viewed as belonging to the semantic subsystem, in fact belong to the pragmatic subsystem.”

- Neo-Gricean account (Atlas & Levinson, Horn, ...)
- Relevance Theory (Sperber & Wilson, Carston, ...)

♦ Bidirectional OT and the Revival of Radical Pragmatics

- (can be made) formal precise
- reformulates, clarifies and relates the earlier approaches

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2 Levinson's typology of implicatures

♦ The Q-heuristics: *For the relevant salient alternates* What isn’t said is not the case.
  - Scalar implicatures
    some of the boys came $\Rightarrow$ not all of the boys came
  - Clausal implicatures
    *If John comes, I'll go $\Rightarrow$ maybe he will, may be he won't*

♦ The I-heuristics: *What is expressed simply is stereotypically exemplified*
  - *kill $\Rightarrow$ stereotypical interpretation*
  - Conditional perfections (*$B, if A \Rightarrow B$ iff $A$*)
  - Bridging inferences
  - **Negative strengthening**
  - The effect of “neg-raising”

♦ The M-heuristics: *What is said in an abnormal way isn’t normal*
  - **Pragmatic effects of double negatives**
  - Periphrastic alternatives to simple causatives

**Remark:** Levinson tries to turn this heuristic classification scheme into a general theory by stipulating a ranking $Q > M > I$. We accept the classification schema but not the theory. (Instead, we consider $M$ as an *epiphenomenon* that results from the interaction of Zipf’s two “economy principles”).
Gradable antonyms and negative strengthening

Consider gradable antonyms like \{good, bad\}, \{large, small\}, \{happy, unhappy\}. Semantically, they are contraries.

Sometimes, the weather is neither good nor bad.
This house is neither large nor small.
Sometimes I’m neither happy nor unhappy.

What are the effects of negating gradable adjectives?

(1) I'm not happy

a. Entailment: It isn’t the case that I’m happy
b. Implicature: I'm unhappy
c. defeasibility: I'm not happy and not unhappy

![Figure 1: Contradictories implicating contraries](image)

The described effect of strengthening is restricted to the positive (unmarked) elements of antonym pairs!
I'm not unhappy

a. Entailment: It isn’t the case that I’m unhappy
b. Implicature: I'm rather happy (but not quite as happy as using the expression “happy” would suggest)
c. defeasibility: I'm not unhappy, in fact I’m happy

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Levinson’s account

- the typical effect of negative strengthening is attributable to the I-principle (R-based strengthening in Horn's theory)
- Double negatives (litotes) fall under the M-principle

Problems

- It’s not easy to see why the interpretation 😊 should be less informative than the interpretation 😘 (intuitively 😘 is less interesting than 😋; a case for relevance? Cf. Carston 1998)
- What is the precise content of the M-principle?
- The M-principle destroys the elegance of the original theory.
3 Two directions of optimization: OT syntax and OT semantics

OT syntax (Grimshaw, Bresnan, …)
Speaker’s perspective => Compare different forms for same meaning. (See lecture 4) Expressive Optimization

OT semantics (de Hoop, Hendriks, de Swarts, …)
Hearer’s perspective => Compare different meanings for same form. Interpretive Optimization

(3) Jane₁ is happy. Mary₂ gave her₁ a present₃. She₁/₂ smiled at her₂/₁ (Centering: smooth-shift > rough-shift)
(4) Most linguists sleep at night
(5) Most linguists drink at night

♦ Natural language interpretation is an optimization problem.
♦ Free generation of interpretations and selection of an optimal one.
♦ Unintelligibility: Some expressions are not interpretable.
Ineffability: Some interpretations cannot be expressed.
OT should reconcile both perspectives. Some arguments for bidirection


- Processing: The same constraints seem to be used in OT syntax (expressive competition) and interpretive parsing (≈ interpretive competition). Fanselow, Schlesewsky & Kliegl (1999).

  OT and the freezing of word order (Lee 2000):

- OT learning algorithm (Tesar & Smolensky):

  “Whenever the structural description which has just been assigned to the overt data (comprehension) is less harmonic than the current grammar’s output (production), relevant constraints are demoted to make the comprehension parse the more harmonic....”

## 4 The Neo-Gricean account and bidirectional OT: An overview

<table>
<thead>
<tr>
<th>I-principle (termed R by Horn)</th>
<th>Q-principle</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity 2, Relation</strong></td>
<td><strong>Quantity 1</strong></td>
</tr>
<tr>
<td><em>Say no more than you must</em> (given Q) (Horn 1984: 13).</td>
<td><em>Say as much as you can</em> (given I) (Horn 1984: 13).</td>
</tr>
<tr>
<td>Read as much into an utterance as is consistent with what you know about the world (bearing the Q-principle in mind) (Levinson 1983: 146f.)</td>
<td>Do not provide a statement that is informationally weaker than your knowledge of the world allows, unless providing a stronger statement would contravene the I-principle (Levinson 1987: 401).</td>
</tr>
<tr>
<td>Conditional perfection, “neg-raising”, bridging inferences, ...</td>
<td>Scalar implicatures</td>
</tr>
</tbody>
</table>

\[ \langle f, m \rangle \text{ satisfies I iff } m \text{ is an optimal interpretation of } f \text{ [bearing Q in mind]} \]

\[ \langle f, m \rangle \text{ satisfies Q iff } f \text{ is an optimal expression for } m \text{ [bearing I in mind]} \]

*Seeks to select the most typical / coherent interpretation*

*Can be considered as a blocking mechanism*

In OT, the principles I and Q are parameterised for constraint systems. The **constraints** determine what is informative or relevant!
5 Strong bidirectional OT and total blocking

Gen: (very general) relation between forms $f$ and interpretations $m$

- **Version 1** (*Classical semantics*)
  $m$ is a state (description) that makes $f$ true.
- **Version 2** (*Update semantics, with underspecification*)
  $m$ is a potential result of updating the context $\sigma$ with $f$

Con: set of ranked violable constraints on form-interpretation pairs

- *markedness* (forms, interpretations)
- *bidirectional* (forms $\times$ interpretations)

Eval: the elements of the generator are evaluated by the constraints they violate. The constraint ranking defines a preference relation “$>$” (*more harmonic*) between pairs $<f, m>$.

**Definition 1 (Optimality)**

$<f, m>$ is optimal iff $<f, m> \in \text{Gen}_\sigma$ and

(Q) there is no $<f', m> \in \text{Gen}_\sigma$ such that $<f', m> > <f, m>$

(I) there is no $<f, m'> \in \text{Gen}_\sigma$ such that $<f, m'> > <f, m>$

McCawley’s example

A1. Black Bill killed the sheriff
A2. Black Bill caused the sheriff to die

*Optimality* describes the case of total blocking and fails to predicts the interpretability of A2.
Negative strengthening

happy
not unhappy
not happy
unhappy

Assumptions

• The complexity of form-interpretation pairs is described by markedness constraints for forms and markedness constraints for interpretations (no interactions)
• The number of the involved negation morphemes determine the markedness of the forms
• The markedness of interpretations decreases towards the ends of the scale (and is maximum in the “neutral” middle)

Comments

• The conception of optimality (definition 1) accounts for total blocking only!
• It does not account for Levinson’s M-principle.
• It conforms to the equilibrium that results when the OT learning algorithm has been applied.
6 Weak bidirectional OT and iconicity

Definition 2 (Super-Optimality)

\(<f, m>\) is super-optimal iff \(<f, m> \in \text{Gen}_o\) and

(Q) there is no super-optimal \(<f', m> \succ <f, m>\)

(I) there is no super-optimal \(<f, m'> \succ <f, m>\)

McCawley’s example again

Levinson’s M-principle and Horn’s division of pragmatic labour are resulting from the solution concept of super-optimality!

Theorems (Jäger 2000, Dekker & van Rooy 2000)

Let’s assume that “\(\succ\)” is transitive and well-founded. Then

- There is a unique super-optimality relation.
- Optimal solutions are super-optimal (but not vice versa).
- If the set of super-optimal solutions is a one-to-one relation between forms \(f\) and interpretations \(m\), then the preference relation between pairs \(<f, m>\) can be equivalently stated by means of a linear order of forms \(f\) and interpretations \(m\).
Negative strengthening

happy
not unhappy
not happy
unhappy

Related notions

Constructional iconicity: A semantically more complex, derived morphological form is unmarked regarding constructional iconicity, if it is symbolized formally more costly than its semantically less complex base for; it is the more marked, the stronger its symbolization deviates from this. (Wurzel 1998: 68).

Prominence alignment (harmonic alignment): The basic principle is that prominent structural positions attract elements which are prominent on other dimensions. In phonology, the peak of the syllable is more prominent than the margins, and it attracts elements which are relatively high in sonority, leaving elements of lesser sonority to function as margins.
In syntax, the subject is the most prominent argument position, and it attracts elements which are relatively prominent on one of various dimensions, e.g. semantic role, animacy, definiteness, person, topicality, leaving less prominent elements to function as non-subjects. In both domains, there is alignment of prominent substance with prominent structure. (cf. Prince & Smolensky 1993, chapter 8; Aissen 2000: in the reader)

**Harmonic alignment and binding phenomena**

(6)  

|---|------------------------|--------------------------|----------------------|----------------------|

*Expressive constraint* “Referential Economy” (*REFECON*): A reflexive element is preferable to a pronoun, which in turn is preferable to an R-expression (simplified from Burzio 1989; Zeevat 2000).

*Interpretive constraint* “Locality of Binding” (*BIND*): Local substitutions have preference over global ones (e.g. Manzini & Wexler 1987)
7 Conclusions

♦ Bidirectional OT helps to put in concrete terms what are the requisites for explaining the peculiarities of negative strengthening (and “neg-raising”)
  - Morpho-syntactic complexities
  - Scales of cognitive states

♦ The M-heuristics can be deduced from (weak) bidirectional OT. It takes the general form of **Iconicity**.
  If more than one interpretations is not normal, then the least abnormal one is selected!

♦ Salience as an important notion. What is the nature of salience?

♦ For more realistic applications of OT in the domain of natural language interpretation it requires
  - gradient acceptability
  - continuous scales
  - stochastic evaluation procedures

♦ Problem: The asymmetry of OT syntax and semantics. How to account for the fact that ambiguities are common in NL and real synonymies are seldom. (see Zeevat 2000; in the reader).
Exercises

1. Consider the following sentences and determine the binding relations predicted by weak bidirectional OT using the constraints REFECON and BIND:

   *Often when I talk to a doctor*,
   
   (A) *the doctor*_{i,j} *disagrees with himself*_{i,j}
   
   (B) *the doctor*_{i,j} *disagrees with him*_{i,j}

2. Consider Beaver’s (to appear; in the reader) theory of local coherence, which is based on the following constraints:

   **PRO-TOP**: The topic is pronominalized
   
   **COHERE**: The topic of the current sentence is the topic of the previous one
   
   **ALIGN**: The topic is in subject position

   **Ranking**: **PRO-TOP** $\gg$ **COHERE** $\gg$ **ALIGN**

   The *topic* of a sentence is defined as the entity referred to in both the current and the previous sentence, such that the relevant referring expression in the previous sentence was minimally oblique (if there is no such entity, the topic can be anything – for example in discourse initial sentences). Sentence topics are underlined in the following example:

   Jane$_1$ is happy $< 1 >$
   Mary$_2$ gave her$_1$ a present$_3$ $< 2 \ 1 \ 3 >$
   She$_{1/2}$ smiled $< 1 > / < 2 >$

   What is the optimal interpretation of the last sentence?
   
   Finally, give an analysis of the following discourse:

   Jane$_1$ is happy $< 1 >$
   Mary$_2$ gave her$_1$ a present$_3$ $< 2 \ 1 \ 3 >$
   She$_{1/2}$ smiled at her$_{2/1}$ $< 1 \ 2 > / < 2 \ 1 >$