Optimal syntax and optimal semantics

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joint work with Reinhard Blutner
Outline of Talk

1. OT: basic picture
2. Applications to syntax/semantics: issues
3. The puzzle of German *wieder* (‘again’)
4. An OT analysis
Optimality Theory: The basic picture

- Three components:
  1. **GEN**: (very general) relation between input and output
  2. **CON**: set of ranked violable constraints on input-output pairs
  3. **EVAL**: Choice function that identifies optimal input-output pairs among a set of candidates (depending on **CON**)

• **CON** induces a (well-founded) ordering of i/o pairs

• **EVAL** picks out the minimal members of its argument wrt. this ordering

\[ \langle i, o \rangle \text{ is optimal iff } o \in \text{EVAL}_{\text{CON}}(\{o' | \text{GEN}(i, o')\}) \]
Two types of constraints:

1. Markedness constraints ⇒ refer to output only
   - “syllables have onsets”, “vowels are oral” ...

2. Faithfulness constraints ⇒ refer to i/o pairing
   - “don’t delete material”, “don’t add material” ...

Markedness and Faithfulness may be intermingled, e.g.

\[ F_1 > M_1 > M_2 > F_2 > \ldots \]
Application to syntax/semantic

• In phonology/morphology, OT takes the speaker perspective

• applied to syntax/semantics, this means:
  1. **GEN** is given by compositional (underspecified) semantics
  2. Markedness constraints only apply to forms, not to meanings
  3. A form/meaning pair may be blocked by a better form for the same meaning, but not the other way round
• Markedness and blocking in both directions:

1. Forms:

   • “Do not move”, “Avoid Focus” ...

(1) a. *John saw yesterday a man

   b. John saw yesterday a man that apart from the beard looked like Bob Dylan
2. Meanings:
   ○ “Avoid accommodation”, “Be strong”, “Be consistent”, “Don’t overlook anaphoric possibilities” ...

(2) If John is late, he regrets that he is late
   ⇒ no global accommodation

- Besides Faithfulness constraints:
  ○ “Old material precedes new material”, “Wh-phrases are fronted”, ...
Reconciling the perspectives

• Blutner 1999:

**Definition 1 (Super-optimality)**

1. $\langle \pi, \lambda \rangle$ satisfies the Q-principle iff $\langle \pi, \lambda \rangle \in \text{GEN}$ and there is no other pair $\langle \pi', \lambda \rangle < \langle \pi, \lambda \rangle$ satisfying the I-principle.

2. $\langle \pi, \lambda \rangle$ satisfies the I-principle iff $\langle \pi, \lambda \rangle \in \text{GEN}$ and there is no other pair $\langle \pi, \lambda' \rangle < \langle \pi, \lambda \rangle$ satisfying the Q-principle.

3. $\langle \pi, \lambda \rangle$ is super-optimal iff it satisfies both the Q-principle and the I-principle.
● Alternative formulation

**Definition 2 (Optimality)**

\( \langle \pi, \lambda \rangle \) is optimal iff

1. \( \langle \pi, \lambda \rangle \in \text{GEN} \),

2. there is no optimal \( \langle \pi', \lambda \rangle < \langle \pi, \lambda \rangle \), and

3. there is no optimal \( \langle \pi, \lambda' \rangle < \langle \pi, \lambda \rangle \).
Theorem 1
If “<” is transitive and well-founded, then
1. there is a unique optimality relation
2. $\langle \pi, \lambda \rangle$ is optimal iff it is super-optimal
Algorithm

\[ OPT = \emptyset; \]
\[ BLCKD = \emptyset; \]

while \((OPT \cup BLCKD \neq GEN)\) {
    \[ OPT = OPT \cup \{x \in GEN - BLCKD \mid \forall y < x : y \in OPT \cup BLCKD\}; \]
    \[ BLCKD = BLCKD \cup \{(\pi, \lambda) \in GEN - OPT \mid \langle \pi', \lambda \rangle \in OPT \lor \langle \pi, \lambda' \rangle \in OPT\}; \]
}

return \((OPT)\);
Example: BT Principle B

(3) a. $\text{Peter}_i$ likes $\text{himself}_i$
   
   b. *$\text{Peter}_i$ likes $\text{himself}_j$
   
   c. *$\text{Peter}_i$ likes $\text{him}_i$
   
   d. $\text{Peter}_i$ likes $\text{him}_j$

- reflexive $<$ pronoun, coreference $<$ disjoint reference
- (3a) is minimal and thus optimal
- (3a) blocks (3b,3c)
- Thus (3d) is optimal
Apparent consequence:

- Optimal form-meaning relation is 1-1, i.e.
  - No Ambiguity
  - No Synonymy
The puzzles of \textit{wieder} (‘again’)

First puzzle

- Modification of a transformational predicate with \textit{again} results in a systematic ambiguity between a \textit{repetitive} (cf. (4b)) and a \textit{restitutive} (cf. (4c)) reading.

(4) a. John opened the window again.
   b. John again performed the action of opening the window.
   c. John brought it about that again the window is open.
Second puzzle

- Disambiguation by word order and intonation in German
  (Fabricius-Hansen 1983)

(5) a. ?(weil) Hans wieder [das Fenster öffnete] \(_F \)
    HANS AGAIN [THE window OPENED] \(_F \)

b. (weil) Hans **wieder** das Fenster öffnete
   HANS again THE WINDOW OPENED (repetitive)

c. (weil) Hans das Fenster wieder **öffnete**
   HANS THE WINDOW AGAIN **opened** (restitutive)

d. (weil) Hans das Fenster **wieder** öffnete
   HANS THE WINDOW again OPENED (repetitive)
Decomposition analyses: Scope ambiguity

\[\text{AGAIN} \quad \text{S} \quad \text{S} \quad \text{NP} \quad \text{VP} \quad \text{V} \quad \text{S} \quad \text{CAUSE} \quad \text{V} \quad \text{S} \quad \text{BECOME} \quad \text{NP} \quad \text{V} \quad \text{the window} \quad \text{open}\]
John CAUSE BECOME AGAIN the window open
Does Decomposition do the job?

- If the ambiguity is due to different scopes of *again*, we expect scopal interaction with quantifiers.

- At a first glance, this seems to be born out:

(6) a. (weil) Peter wieder ein Fenster geöffnet hat

\[
\text{Peter again a window opened has} \\
\text{CAUSE(p,BECOME(again(}\exists x(\text{window}(x) \land \text{open}(x)))))) \\
\text{again(}\exists x(\text{window}(x) \land \text{CAUSE(p,BECOME(open(x)))))) \\
\]

b. (weil) Peter ein Fenster wieder geöffnet hat

\[
\text{Peter a window again opened has} \\
\exists x(\text{window}(x) \land \text{CAUSE(p,BECOME(again(open(x)))))) \\
\exists x(\text{window}(x) \land \text{again(CAUSE(p,BECOME(open(x)))))) \\
\]

‘Peter opened a window again’
• Things become more involved with “control” accomplishments, i.e. accomplishments where agent and theme are necessarily identical.

(7) Some delawares settled in New Jersey again.

• (7) only presupposes that some delawares used to live in NJ — not necessarily those that are about to settle there now.
**Assertion**

\[ \exists x (\text{DELAWARE}(x) \land \text{CAUSE}(x, \text{BECOME} (\text{LIVE\_IN}(x, \text{NJ}))))(i) \]

**Presupposition**

\[ \exists j < i \exists x (\text{DELAWARE}(x) \land \text{LIVE\_IN}(x, \text{NJ})(j)) \]
• $\exists x\text{DELAWARE}(x)$ occurs twice $\Rightarrow$
  
  AGAIN $\gg$ SUBJ

• Since delawares binds the subject argument place of CAUSE:
  
  SUBJ $\gg$ CAUSE

• Since we are dealing with a restitutive reading:
  
  CAUSE $\gg$ AGAIN

Scope Paradox!
1. *again* always takes scope over BECOME and CAUSE

2. the meaning of restitutive *again* is the inverse of BECOME, call it RESULT

Repetitive *again*:

(8) $\lambda P, i.P(i) : \exists j < i(P(j))$

Restitutive *again*:

(9) $\lambda P, i.P(i) : \exists j < i(RESULT(P)(j))$
• (7) comes out as

\[ (10) \quad \lambda i. \exists x (\text{DELAWARE}(x) \land \text{SETTLE\_IN}(i, x, \text{NJ})) : \exists j < i (\text{RESULT}(\lambda i. \exists x (\text{DELAWARE}(x) \land \text{SETTLE\_IN}(i, x, \text{NJ}))(j)) \]
Further argument against structural account:
Word order effects disappear with indefinites

(11) a. (weil) Hans wieder ein *Fenster* öffnete
   HANS AGAIN a *window* OPENED (narrow scope restitutive)

b. (weil) Hans *wieder* ein Fenster öffnete
   HANS *again* a WINDOW OPENED (narrow scope repetitive)

c. (weil) Hans ein Fenster wieder öffnete
   HANS a WINDOW AGAIN *opened* (wide scope restitutive)

d. (weil) Hans ein Fenster *wieder* öffnete
   HANS a WINDOW *again* OPENED (wide scope repetitive)
• Focus has the similar effect:

\[(12)\] a. (weil) Hans wieder das \textbf{linke} Fenster öffnete

\begin{align*}
\text{HANS AGAIN THE } & \textbf{LEFT} \text{ WINDOW OPENED (ambiguous)} \\
b. \ ?(weil) \text{ Hans das } & \textbf{linke} \text{ Fenster wieder öffnete} \\
\text{HANS THE } & \textbf{LEFT} \text{ WINDOW AGAIN OPENED}
\end{align*}

• Focus is associated with \textit{wieder}

(triggers additional presupposition)
Constraints

- Markedness constraints semantics:
  - *ACC: Avoid Accommodation (Blutner 1999)
  - DOAP: Don’t overlook anaphoric possibilities! (de Hoop 1997)

- Faithfulness constraints:
  - SCOPE: Make scope transparent on s-structure!
  - SCR: Definites scramble (de Hoop 1997)
  - GIVEN: If a constituent is not F-marked, it must be given (Schwarzschild 1999)
Constraint ranking

SCOPE > \{DOAP = SCR\} > \{GIVEN = *ACC\}

☞ If ranking is not strict, ambiguity and polysemy become possible
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de Hoop, H.: 1997, Optional scrambling and predication, in Proceedings of the Texas Linguistic Society: Conference on the Syntax and Semantics of Predication, University of Texas at Austin


Schwarzschild, R.: 1999, Givenness, avoid F and other constraints on the placement of accent, Natural Language Semantics 7(2), 141–177