Optimal syntax and optimal semantics

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DIP Colloquium

University of Amsterdam

September 7, 1999

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

$$\langle i, o\rangle \text{ is optimal iff } o \in \mathbf{EVAL_{CON}}(\{o'|\mathbf{GEN}(i, o')\})$$

- 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.

$$\mathbf{F}_1 > \mathbf{M}_1 > \mathbf{M}_2 > \mathbf{F}_2 > \ldots$$

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
$\Rightarrow$ 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 $\langle \pi, \lambda \rangle \in$ **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 $\langle \pi, \lambda \rangle \in$ **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. $\langle \pi, \lambda \rangle \in \mathbf{GEN}$,
  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

$\mathit{OPT} = \emptyset$;

$\mathit{BLCKD} = \emptyset$;

while $(\mathit{OPT} \cup \mathit{BLCKD} \neq \mathbf{GEN})$ {

$\mathit{OPT} = \mathit{OPT} \cup \{x \in \mathbf{GEN} - \mathit{BLCKD} | \forall y < x : y \in \mathit{OPT} \cup \mathit{BLCKD}\}$;

$\mathit{BLCKD} = \mathit{BLCKD} \cup \{\langle \pi, \lambda \rangle \in \mathbf{GEN} - \mathit{OPT} |$
$\langle \pi', \lambda \rangle \in \mathit{OPT} \vee \langle \pi, \lambda' \rangle \in \mathit{OPT}\}$;

}

return (OPT);

Example: BT Principle B

(3) a. Peter$_i$ likes himself$_i$

b. *Peter$_i$ likes himself$_j$

c. *Peter$_i$ likes him$_i$

d. Peter$_i$ likes 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 *wieder* ('again')

First puzzle

- Modification of a transformational predicate with *again* results in a systematic ambiguity between a **repetitive** (cf. (4b)) and a **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)

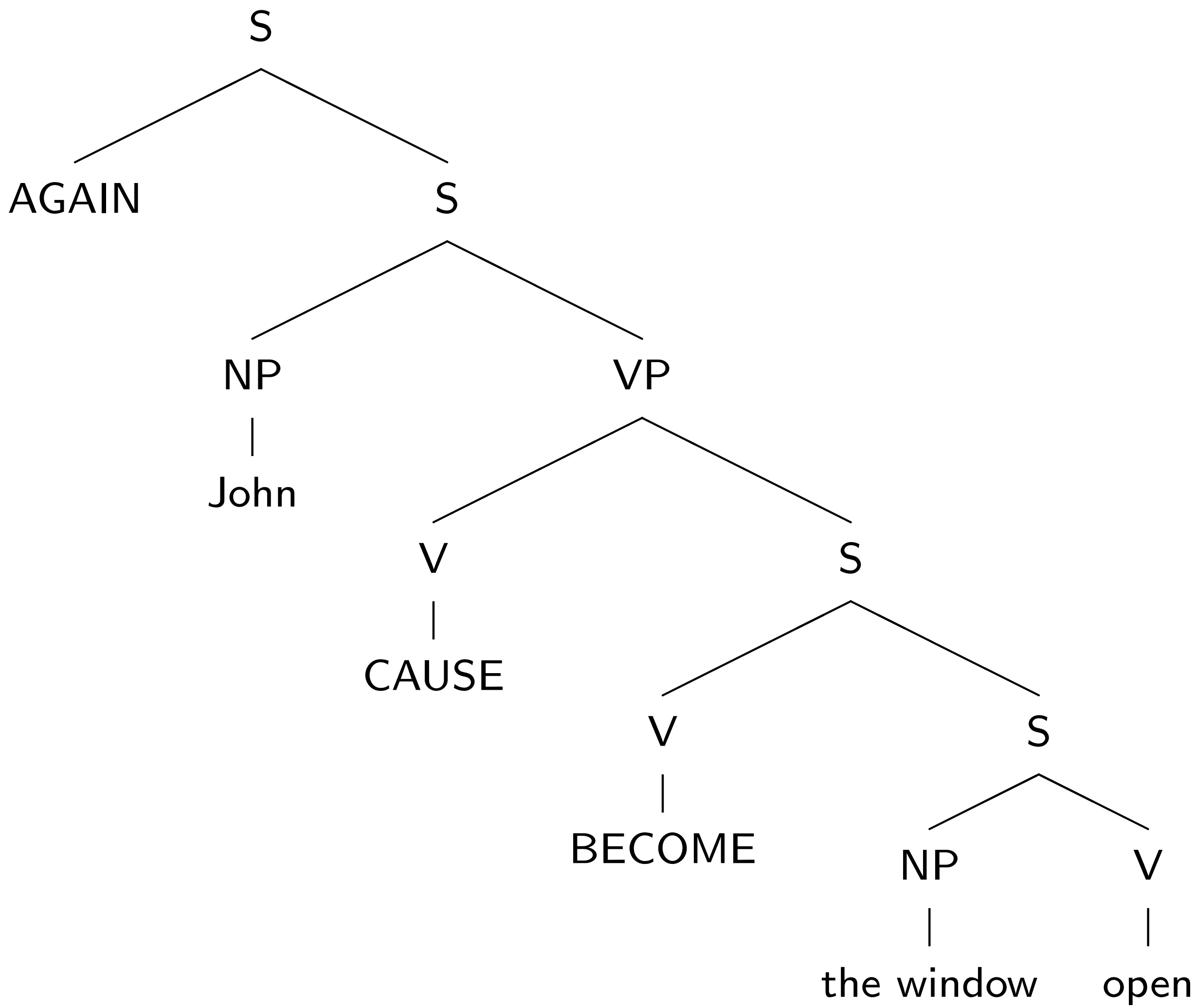
(5) a. ?(weil) Hans wieder [das **Fenster** öffnete]$_F$
HANS AGAIN [THE **window** OPENED]$_F$

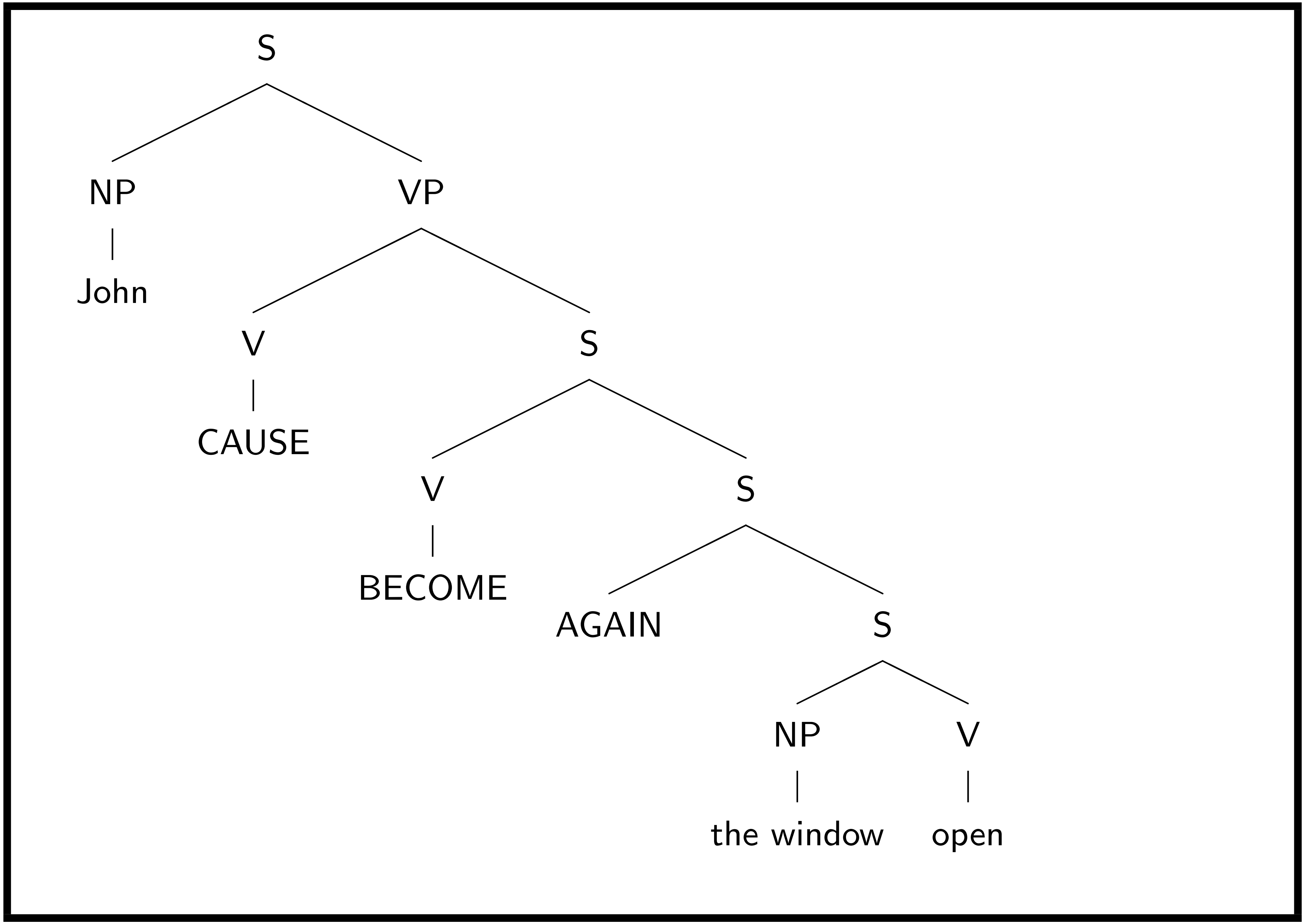
b. (weil) Hans **wieder** das Fenster öffnete
HANS **again** THE WINDOW OPENED (repetitive)

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




S
NP
VP
John
V
S
CAUSE
V
S
BECOME
AGAIN
S
NP
V
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
PETER AGAIN A WINDOW OPENED HAS
CAUSE(p,BECOME(again(∃x(window(x) ∧ open(x)))))
again(∃x(window(x) ∧ CAUSE(p,BECOME(open(x)))))

b. (weil) Peter ein Fenster wieder geöffnet hat
PETER A WINDOW AGAIN OPENED HAS
∃x(window(x) ∧ CAUSE(p,BECOME(again(open(x)))))
∃x(window(x) ∧ 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

$$\exists x(\textsc{delaware}(x) \wedge \mathrm{CAUSE}(x, \mathrm{BECOME}(\textsc{live\_in}(x, \textsc{nj})))(i))$$

Presupposition

$$\exists j < i \exists x(\textsc{delaware}(x) \wedge \textsc{live\_in}(x, \textsc{nj})(j))$$

- $\exists x\text{DELAWARE}(x)$ occurs twice $\Rightarrow$

$$\text{AGAIN} >> \text{SUBJ}$$

- Since *delawares* binds the subject argument place of CAUSE:

$$\text{SUBJ} >> \text{CAUSE}$$

- Since we are dealing with a restitutive reading:

$$\text{CAUSE} >> \text{AGAIN}$$

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) $\lambda P, i.P(i) : \exists j < i(\mathrm{RESULT}(P)(j))$

- (7) comes out as

(10) $\lambda i.\exists x(\textsc{delaware}(x) \wedge \textsc{settle\_in}(i, x, \textsc{nj}))$:
$\exists j <$
$i(\mathrm{RESULT}(\lambda i.\exists x(\textsc{delaware}(x) \wedge \textsc{settle\_in}(i, x, \textsc{nj})))(j))$

- 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 **linke** Fenster öffnete
HANS AGAIN THE **left** WINDOW OPENED (ambiguous)

b. ?(weil) Hans das **linke** Fenster wieder öffnete
HANS THE **left** WINDOW AGAIN OPENED

- Focus is associated with *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

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

☞ If ranking is not strict, ambiguity and polysemy become possible

Repetitive

	SCOPE	DOAP	SCR	GIVEN	*ACC
(5a)		*	*		**
☞(b)			*		**
(c)		**			**
☞(d)		*			**

Restitutive

	SCOPE	DOAP	SCR	GIVEN	*ACC
(5a)		*	*		*
(b)			*	**	*
☞(c)					*
(d)				*	*

Repetitive/narrow scope

	SCOPE	DOAP	SCR	GIVEN	*ACC
(11a)		*			**
☞(b)					**
(c)	*	*			**
(d)	*				**

Restitutive/narrow scope

	SCOPE	DOAP	SCR	GIVEN	*ACC
☞(11a)		*			*
(b)				**	*
(c)	*				*
(d)	*			*	*

Repetitive/wide scope

	SCOPE	DOAP	SCR	GIVEN	*ACC
(11a)	*	*			**
(b)	*				**
(c)		*			**
☞(d)					**

Restitutive/wide scope

	SCOPE	DOAP	SCR	GIVEN	*ACC
(11a)	*	*			*
(b)	*			*	*
☞(c)					*
(d)				*	*

Repetitive

	SCOPE	DOAP	SCR	GIVEN	*ACC
☞(12a)			*		**
(b)	*				**

Restitutive

	SCOPE	DOAP	SCR	GIVEN	*ACC
☞(12a)			*	*	*
(b)	*			*	

References

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