

Integrating GIVENness into a structured meaning approach in HPSG

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Summary

Overview

- ▶ Existing HPSG approaches successfully capture some aspects of the relation between intonation, syntax, semantics, and information structure.

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- ▶ Existing HPSG approaches successfully capture some aspects of the relation between intonation, syntax, semantics, and information structure.
- ▶ As a result, some constraints previously stipulated in syntax can be explained through the nature of the integration of a sentence into the discourse,

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- ▶ Existing HPSG approaches successfully capture some aspects of the relation between intonation, syntax, semantics, and information structure.
- ▶ As a result, some constraints previously stipulated in syntax can be explained through the nature of the integration of a sentence into the discourse, e.g., for
 - ▶ partial constituents in the nominal (De Kuthy 2002) and the verbal domain (De Kuthy & Meurers 2003)
 - ▶ multiple fronted elements (Bildhauer & Cook 2010)

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 - ▶ partial constituents in the nominal (De Kuthy 2002) and the verbal domain (De Kuthy & Meurers 2003)
 - ▶ multiple fronted elements (Bildhauer & Cook 2010)
- ▶ None of the HPSG approaches so far capture the important empirical generalizations established by Schwarzschild (1999) around the notion of *givenness*.

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- ▶ As a result, some constraints previously stipulated in syntax can be explained through the nature of the integration of a sentence into the discourse, e.g., for
 - ▶ partial constituents in the nominal (De Kuthy 2002) and the verbal domain (De Kuthy & Meurers 2003)
 - ▶ multiple fronted elements (Bildhauer & Cook 2010)
- ▶ None of the HPSG approaches so far capture the important empirical generalizations established by Schwarzschild (1999) around the notion of *givenness*.
- ▶ In this talk, we extend our HPSG approach to capture givenness, explaining the so-called *deaccenting* cases.

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Intonation and Focus

- ▶ English and German are intonation languages
 - ▶ Information structuring is signaled by the intonation of an utterance, including different types of pitch accents.
 - ▶ presence and nature of an accent is an indicator of the discourse function of a particular part of a sentence (cf., e.g., Beckman & Pierrehumbert 1986; Grice et al. 2002).

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Summary



- ▶ English and German are intonation languages
 - ▶ Information structuring is signaled by the intonation of an utterance, including different types of pitch accents.
 - ▶ presence and nature of an accent is an indicator of the discourse function of a particular part of a sentence (cf., e.g., Beckman & Pierrehumbert 1986; Grice et al. 2002).
- ▶ Most widely discussed discourse function: focus
 - ▶ Intuitively, the “most important” or “new” information of an utterance (e.g., Krifka 2007).
 - ▶ Every focused expression must contain a pitch accent.

- ▶ Focus can be understood to be the part of an answer corresponding to the *wh*-element of a question.

(1) a. *What did John rent?*

b. *He rented* \llbracket *a BICYCLE* \rrbracket_F . (narrow NP focus)

- ▶ The answer in (1b) provides the element asked for, the focus, which is marked with $\llbracket \rrbracket_F$.
- ▶ Out of the various alternative things John could have rented, he picked a bicycle.

Focus Projection

- ▶ Observation: The same prosodic realization of an utterance can appear in different contexts.

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Focus Projection

- ▶ Observation: The same prosodic realization of an utterance can appear in different contexts.

(2) *John rented a BICYCLE.*

(3) a. *What did John rent?*

John rented [[a BICYCLE]]_F.

(narrow NP focus)

Focus Projection

- ▶ Observation: The same prosodic realization of an utterance can appear in different contexts.

(2) *John rented a BICYCLE.*

(3) a. *What did John rent?*

John rented **[[a BICYCLE]]_F.**

(narrow NP focus)

b. *What did John do?*

John **[[rented a BICYCLE]]_F.**

(wide VP focus)

Focus Projection

- ▶ Observation: The same prosodic realization of an utterance can appear in different contexts.

(2) *John rented a BICYCLE.*

(3) a. *What did John rent?* (narrow NP focus)
John rented **[[a BICYCLE]]_F.**

b. *What did John do?* (wide VP focus)
John **[[rented a BICYCLE]]_F.**

c. *What happened yesterday?* (wide S focus)
[[John rented a BICYCLE]]_F.

Focus Projection

- ▶ Observation: The same prosodic realization of an utterance can appear in different contexts.

(2) *John rented a BICYCLE.*

(3) a. *What did John rent?* (narrow NP focus)

John rented \llbracket *a BICYCLE* \rrbracket_F .

b. *What did John do?* (wide VP focus)

John \llbracket *rented a BICYCLE* \rrbracket_F .

c. *What happened yesterday?* (wide S focus)

\llbracket *John rented a BICYCLE* \rrbracket_F .

- ▶ Lexical and syntactic conditions have been formulated to define when focus can project (e.g., Gussenhoven 1983; von Stechow & Uhmman 1986; Uhmman 1991; Selkirk 1995).

- ▶ Schwarzschild (1999) observed an important **dissociation of focus and new information**:
 - ▶ when focused material is already given in the discourse, the focus includes unaccented substantive material
 - so-called **deaccenting** of given material

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- ▶ Schwarzschild (1999) observed an important **dissociation of focus and new information**:
 - ▶ when focused material is already given in the discourse, the focus includes unaccented substantive material
 - so-called **deaccenting** of given material

(4) *The conference participants are renting all kind of vehicles.
Yesterday, Bill came to the conference driving a red convertible.*

a. *What did John rent?*

b. *He rented [[a GREEN convertible]]_F.*

- ▶ Schwarzschild (1999) observed an important **dissociation of focus and new information**:
 - ▶ when focused material is already given in the discourse, the focus includes unaccented substantive material
 - so-called **deaccenting** of given material
- (4) *The conference participants are renting all kind of vehicles. Yesterday, Bill came to the conference driving a red convertible.*
 - What did John rent?*
 - He rented [[a GREEN convertible]]_F.*
- ▶ Where given material occurs in the focus, the pitch accent is realized on another, new word in the focus.

Our approach

- ▶ Büring (2006) shows that deaccenting of given material is a widespread phenomenon.
 - ▶ Yet, currently it is not captured by any HPSG approach.

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Our approach

- ▶ Büring (2006) shows that deaccenting of given material is a widespread phenomenon.
 - ▶ Yet, currently it is not captured by any HPSG approach.
- ⇒ Extend HPSG to capture givenness and make the proper predictions for deaccenting examples.
 - ▶ We provide an HPSG account using structured meanings (Krifka 1992).

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An HPSG analysis incorporating givenness

- ▶ Starting point: information structure-syntax interface developed in De Kuthy (2002) and De Kuthy & Meurers (2003)
- ▶ inspired by Engdahl & Vallduví (1996) in that it is lexically driven and constraint-based, but differing in
 - ▶ **where** information structure is encoded,
 - ▶ **what** is represented, and the
 - ▶ **empirical coverage** of the focus projection principles

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Representing information structure in HPSG

Where?

- ▶ We introduce information structure as appropriate for *signs*
 - ▶ not for *local* objects as in Engdahl & Vallduví (1996)
- ▶ Motivation: required for proper interaction with UDCs
 - ▶ fillers relevant for information structure, not the traces

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Representing information structure in HPSG

What?

- ▶ We represent information structure as a structuring of **semantic representations**, following structured meaning approaches (von Stechow 1981; Jacobs 1983; Krifka 1992).
 - ▶ not entire *signs* as in Engdahl & Vallduví (1996)

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 - ▶ not entire *signs* as in Engdahl & Vallduví (1996)
- ▶ We use a standard semantic object language: Ty2
 - ▶ Ty2 integrated into HPSG by Sailer (2000).

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- ▶ We introduce FOCUS and GIVEN attributes with lists of Ty2 expressions as values, so-called *meaningful expressions*.

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- ▶ We introduce FOCUS and GIVEN attributes with lists of Ty2 expressions as values, so-called *meaningful expressions*.

(5) *What did John do?*

(wide VP focus)

John \llbracket *rented a BICYCLE* \rrbracket_F .

$$\left[\begin{array}{l} \text{PHON} \langle \textit{John}, \textit{rented}, \textit{a}, \textit{BICYCLE} \rangle \\ \text{SYNSEM|LOC|CONT|LF} \exists x [\textit{bicycle}'(x) \wedge \textit{rent}'(j, x)] \\ \text{INFO-STRUC} \left[\begin{array}{l} \text{FOCUS} \langle \lambda y \exists x [\textit{bicycle}'(x) \wedge \textit{rent}'(y, x)] \rangle \\ \text{GIVEN} \langle \lambda P [P(\textit{john}')] \rangle \end{array} \right] \end{array} \right]$$

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Representing information structure in HPSG

Accents and lexical information structure

- ▶ To encode whether a word bears an accent or not, we enrich the phonology with the boolean feature `ACCENT`.

$$\left[\begin{array}{l} \textit{sign} \\ \text{PHON} \left[\begin{array}{ll} \text{PHON-STR} & \textit{list} \\ \text{ACCENT} & \textit{bool} \end{array} \right] \end{array} \right]$$

- ▶ In general, different accent types can be introduced, e.g., following ToBI (Beckman & Pierrehumbert 1986).

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Accents and lexical information structure

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$$\left[\begin{array}{l} \textit{sign} \\ \text{PHON} \left[\begin{array}{ll} \text{PHON-STR} & \textit{list} \\ \text{ACCENT} & \textit{bool} \end{array} \right] \end{array} \right]$$

- ▶ In general, different accent types can be introduced, e.g., following ToBI (Beckman & Pierrehumbert 1986).
- ▶ Relating accent placement and focus for words:

$$\textit{word} \rightarrow \left[\begin{array}{ll} \text{PHON|ACCENT} & + \\ \text{SS|LOC|CONT|LF} & \boxed{1} \\ \text{INFO-STRUC} & \left[\text{FOCUS} \langle \boxed{1} \rangle \right] \end{array} \right] \vee \left[\begin{array}{ll} \text{PHON|ACCENT} & - \\ \text{INFO-STRUC} & \left[\text{FOCUS} \langle \rangle \right] \end{array} \right]$$

Information structure: A basic example



John rented a BICYCLE

$$\left[\begin{array}{l} \text{s|LOC|CONT|LF} \quad \exists x[\text{bicycle}'(x) \wedge \text{rent}'(\text{john}', x)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \boxed{2} \lambda y \exists x[\text{bicycle}'(x) \wedge \text{rent}'(y, x)] \rangle \end{array} \right]$$

John

rented a BICYCLE

$$\left[\begin{array}{l} \text{PHON|ACCENT} \quad - \\ \text{s|LOC|CONT|LF} \quad \lambda P[P(\text{john}')] \\ \text{INFO-STRUC|FOCUS} \quad \langle \rangle \end{array} \right]$$

$$\left[\begin{array}{l} \text{s|LOC|CONT|LF} \quad \boxed{2} \lambda y \exists x[\text{bicycle}'(x) \wedge \text{rent}'(y, x)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \boxed{2} \rangle \end{array} \right]$$

rented

a BICYCLE

$$\left[\begin{array}{l} \text{PHON|ACCENT} \quad - \\ \text{s|LOC|CONT|LF} \quad \lambda w \lambda y[\text{rent}'(y, w)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \rangle \end{array} \right]$$

$$\left[\begin{array}{l} \text{s|LOC|CONT|LF} \quad \boxed{3} \lambda Q \exists x[\text{bicycle}'(x) \wedge Q(x)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \boxed{3} \rangle \end{array} \right]$$

a

BICYCLE

$$\left[\begin{array}{l} \text{PHON|ACCENT} \quad - \\ \text{s|LOC|CONT|LF} \quad \lambda P \lambda Q \exists x[P(x) \wedge Q(x)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \rangle \end{array} \right]$$

$$\left[\begin{array}{l} \text{PHON|ACCENT} \quad + \\ \text{s|LOC|CONT|LF} \quad \boxed{4} \lambda z[\text{book}'(z)] \\ \text{INFO-STRUC|FOCUS} \quad \langle \boxed{4} \rangle \end{array} \right]$$

Information structure of phrases

- ▶ Focus projection principles define which parts of the sentence can be in the focus given an accent placement.

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Information structure of phrases

- ▶ Focus projection principles define which parts of the sentence can be in the focus given an accent placement.

Base case: no focus projection

- ▶ Collect the focus values of the daughters.

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Information structure of phrases

- ▶ Focus projection principles define which parts of the sentence can be in the focus given an accent placement.

Base case: no focus projection

- ▶ Collect the focus values of the daughters.

$$\textit{phrase} \rightarrow \left[\begin{array}{l} \text{INFO-STRUC|FOCUS } \boxed{1} \oplus \boxed{2} \\ \text{HEAD-DTR|INFO-STRUC|FOCUS } \boxed{1} \\ \text{NON-HEAD-DTR|INFO-STRUC|FOCUS } \boxed{2} \end{array} \right]$$

∨ ... *the focus projection cases* ...

Information structure of phrases

Focus projection in NPs and PPs (De Kuthy 2002)

- ▶ Focus can project in a PP or NP if the rightmost constituent in it is focused.

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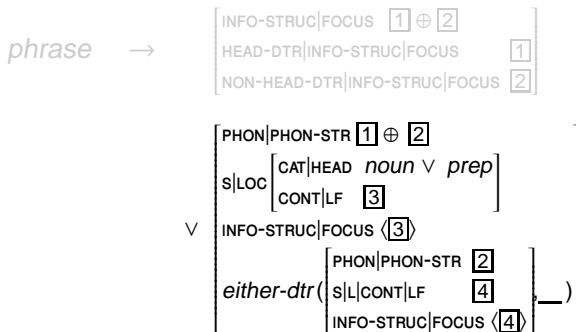
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Information structure of phrases

Focus projection in NPs and PPs (De Kuthy 2002)

- Focus can project in a PP or NP if the rightmost constituent in it is focused.



Information structure of phrases

Focus projection in NPs and PPs (De Kuthy 2002)

- Focus can project in a PP or NP if the rightmost constituent in it is focused.

$$\begin{array}{l} \text{phrase} \rightarrow \left[\begin{array}{l} \text{INFO-STRUC|FOCUS } \boxed{1} \oplus \boxed{2} \\ \text{HEAD-DTR|INFO-STRUC|FOCUS } \boxed{1} \\ \text{NON-HEAD-DTR|INFO-STRUC|FOCUS } \boxed{2} \end{array} \right] \\ \\ \vee \left[\begin{array}{l} \text{PHON|PHON-STR } \boxed{1} \oplus \boxed{2} \\ \text{S|LOC } \left[\begin{array}{l} \text{CAT|HEAD } \textit{noun} \vee \textit{prep} \\ \text{CONT|LF } \boxed{3} \end{array} \right] \\ \text{INFO-STRUC|FOCUS } \langle \boxed{3} \rangle \\ \textit{either-dtr} \left(\begin{array}{l} \text{PHON|PHON-STR } \boxed{2} \\ \text{S|L|CONT|LF } \boxed{4} \\ \text{INFO-STRUC|FOCUS } \langle \boxed{4} \rangle \end{array} \right) \end{array} \right] \end{array}$$

$$\textit{either-dtr}(\boxed{1}, \boxed{2}) := \left[\begin{array}{l} \text{HEAD-DTR } \boxed{1} \\ \text{NON-HEAD-DTR } \boxed{2} \end{array} \right] \vee \left[\begin{array}{l} \text{HEAD-DTR } \boxed{2} \\ \text{NON-HEAD-DTR } \boxed{1} \end{array} \right]$$

Information structure of phrases

Focus projection in the presence of givenness

- ▶ Focus can project from any focused daughter if the other daughter is given.

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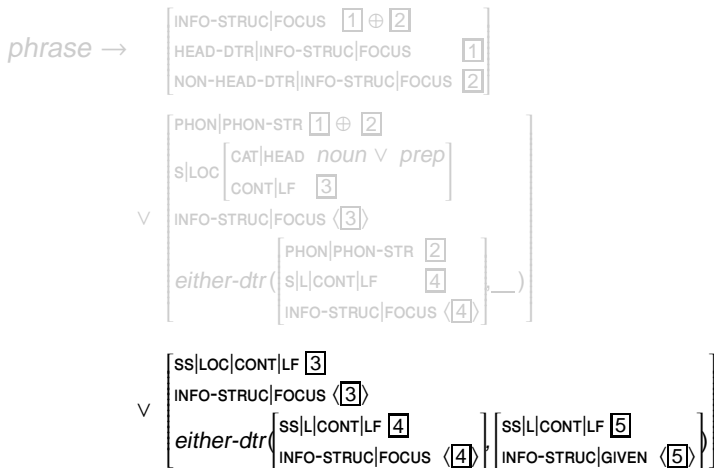
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Information structure of phrases

Focus projection in the presence of givenness

- ▶ Focus can project from any focused daughter if the other daughter is given.



Focus projection with deaccenting

Example revisited

- (4) *The conference participants are renting all kind of vehicles.
Yesterday, Bill came to the conference driving a red convertible.*
- What did John rent?*
 - He rented [[a GREEN convertible]]_F.*

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Givenness of phrases

- ▶ Phrases collect the givenness of their daughters.
- ▶ Where both daughters are given, the entire meaning of the mother is given.

$$\textit{phrase} \rightarrow \left[\begin{array}{l} \text{INFO-STRUC|GIVEN} \quad \boxed{1} \oplus \boxed{2} \\ \text{HEAD-DTR|INFO-STRUC|GIVEN} \quad \boxed{1} \\ \text{NON-HEAD-DTR|INFO-STRUC|GIVEN} \quad \boxed{2} \end{array} \right]$$

$$\vee \left[\begin{array}{l} \text{SS|L|CONT|LF} \quad \boxed{1} \\ \text{INFO-STRUC|GIVEN} \quad \langle \boxed{1} \rangle \\ \text{HEAD-DTR} \left[\begin{array}{l} \text{SS|L|CONT|LF} \quad \boxed{2} \\ \text{INFO-STRUC|GIVEN} \quad \langle \boxed{2} \rangle \end{array} \right] \\ \text{NON-HEAD-DTR} \left[\begin{array}{l} \text{SS|L|CONT|LF} \quad \boxed{3} \\ \text{INFO-STRUC|GIVEN} \quad \langle \boxed{3} \rangle \end{array} \right] \end{array} \right]$$

Could we only use givenness, eliminating focus?

- ▶ It would fail to predict that in a focused VP where neither verb nor argument is given, the argument must be accented:

(6) *What did John do?*

(wide VP focus)

a. *John* \llbracket *rented a BICYCLE* \rrbracket_F .

b. % *John* \llbracket *RENTED a bicycle* \rrbracket_F .



Outlook

Uniform approach to givenness and what can be projected over?

- ▶ Focus projection is limited for unexpected material:

(7) *Hi John, good to see you in the department, but why are you so pale?*

a. *[[I just saw a man with an AXE!]]_F*

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Kordula De Kuthy and
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- ▶ The material focus projected over cannot be too unexpected; it must be possible to accommodate it.

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- ▶ The material focus projected over cannot be too unexpected; it must be possible to accommodate it.
- ▶ Is the required expectability of material focus-projected over related to the deaccenting of given material?
 - ▶ Possible relation to purely pragmatic approaches eliminating focus projection (Roberts 2006; Kadmon 2006).

Outlook

Empirical status of focus projection

- ▶ Recent formal pragmatic approaches have claimed that focus projection does not exist (Roberts 2006; Kadmon 2006)

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GIVENness into a
structured meaning
approach in HPSG

Kordula De Kuthy and
Detmar Meurers

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Summary

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Empirical status of focus projection

- ▶ Recent formal pragmatic approaches have claimed that focus projection does not exist (Roberts 2006; Kadmon 2006)
- ▶ Requires empirical exploration (De Kuthy & Meurers 2010, 2012)
 - ▶ Survey of experimental evidence for focus projection
 - ▶ Exploration of annotated corpora
 - ▶ parsed versions off German IMS Radionews Corpus and Verbmobil Corpus

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- ▶ Recent formal pragmatic approaches have claimed that focus projection does not exist (Roberts 2006; Kadmon 2006)
 - ▶ Requires empirical exploration (De Kuthy & Meurers 2010, 2012)
 - ▶ Survey of experimental evidence for focus projection
 - ▶ Exploration of annotated corpora
 - ▶ parsed versions off German IMS Radionews Corpus and Verbmobil Corpus
 - ▶ Corpora with information structure annotation
 - ▶ for English: NXT Switchboard (Calhoun et al. 2010)
 - ▶ but information structure annotation hard (Dipper et al. 2004)
- Idea: collect corpora with explicit, linguistic task context
- ▶ Corpus of answers to reading comprehension questions makes text & question explicit (Meurers et al. 2011, 2012).

- ▶ Extended our HPSG approach to information structure to capture givenness (Schwarzschild 1999).
- ▶ Correctly licenses *deaccenting* of given information, a widespread phenomenon (Büring 2006) not previously dealt with in HPSG.
- ▶ Issues we are currently exploring:
 - ▶ relation of deaccenting of given information to role of expected information
 - ▶ empirical exploration (corpora, experiments) of where and under what conditions focus projection occurs, and whether syntax plays a role in this

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