Sonderforschungsbereich 632

Informationsstruktur:
Die sprachlichen Mittel der Gliederung von Äußerung, Satz und Text

Information structure –
basic concepts and its realization in a cross-linguistic perspective

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Deutsche Grammatik

(1919, Vol. III, Part IV, Kapitel 1: Aufbau des einfachen Satzes, § 54)

"Fritz fährt morgen nach Potsdam."

(1)

a. **Wohin** fährt Karl morgen?	Karl fährt morgen nach **POTSdam**.
b. **Wann** fährt Karl nach Potsdam?	Karl fährt **MORgen** nach Potsdam.
c. **Wie** reist Karl morgen nach Potsdam?	Karl **FÄHRT** morgen nach Potsdam.
d. **Wer** fährt morgen nach Potsdam?	**KARL** fährt morgen nach Potsdam.

- The same information is presented in different ways according to different intentions of the speaker.
- Distinction between grammatical and information structural ("*psychologisch*") level.
- Linguistic means as expression of information structure

Structure of the talk

INFORMATION STRUCTURE (IS)

- The cognitive perspective – common ground content & management

IS-DIMENSIONS & IS-CATEGORIES

- Information status / Focus – background / Topic – comment

ELICITATION OF IS

- QUIS – Questionnaire of information structure

LINGUISTIC MEANS TO EXPRESS IS-CATEGORIES

- Syntax – obligatory focus marking languages vs. syntactic marking
- Prosody – as a deviation from the neutral register

ANNOTATION OF IS

- Guidelines and corpus research / data storing architecture

What is “Information structure” anyway?

Michael Alexander Kirkwood Halliday –

- Halliday (1967) introduced the term to denote the division of information units in spoken languages

  “The distribution of the discourse into information units is obligatory in the sense that the text must consist of a sequence of such units.” (Halliday 1967: 200)

(2) a. //John saw the play yesterday//
  b. //John // saw the play yesterday//
  c. //John // saw the play // yesterday//
  d. //John saw the play yesterday but said nothing about it//
  (Halliday 1967: 201)

⇒ **Unmarked/marked option in mapping information structure to sentence structure.**

⇒ **Information structure is realized phonologically**

What is “Information structure” anyway?

Wallace Chafe –

- Distinction of grammatical, logical and psychological level (cf. Paul 1919)
- Introduced the term “*information packaging*”:

  packaging refers to a status of a discourse referent and “the speaker's assessment of how the addressee is able to process what he is saying against the background of a particular context.”

  packaging concerns “primarily how the message is sent and only secondarily with the message itself, just as the packaging of toothpaste can affect sales in partial independence of the quality of the toothpaste inside.” (Chafe 1976: 27-28).

⇒ **The way some propositional content is transmitted.**

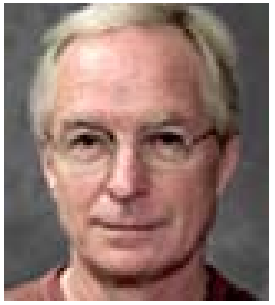
(3) a. Betty peeled the onions.
    b. The onions were peeled by Betty.
    c. The onions, Betty peeled. (Chafe 1976: 27)

What is “Information structure” anyway?

Ellen F. Prince –

“the tailoring of an utterance by a sender to meet the particular assumed needs of the intended receiver. That is, information-packaging in natural language reflects the sender's hypotheses about the receiver's assumptions and beliefs and strategies.” (Prince 1981: 224)

⇒ **The FORM of an utterance ~ mental states of interlocutors**



Knud Lambrecht –

“[…] a system of options which grammars offer speakers for expressing given propositional contents in different grammatical forms under varying discourse circumstances.” (Lambrecht 1994:xiii)

“That component of sentence grammar in which propositions as conceptual representations of states of affairs are paired with lexicogrammatical structures in accordance with the mental states of interlocutors who use and interpret these structures as units of information in given discourse contexts” (Lambrecht 1994:5)

⇒ **Formal expression of pragmatic structuring of a proposition in discourse**

What is “Information structure” anyway?

Manfred Krifka –

“[…] characterization of IS […] within a communicative model of Common Ground (CG), which distinguishes between CG content and CG management. IS is concerned with those features of language that affect the local CG. (Krifka 2008:243)

Caroline Féry –

“packaging of information that meets the immediate communicative needs of the interlocutors, i.e. the techniques that optimize the form of the message with the goal that it be well understood by the addressee in the current attentional state.” (Féry & Krifka 2008:123)

Malte Zimmermann –

“Information structure is that cognitive domain that mediates between the modules of linguistic competence in the narrow sense, such as syntax, phonology, and morphology, and other cognitive faculties which serve the central purpose of the fixation of belief by way of information update, pragmatic reasoning, and general inference processes.” (Zimmermann & Féry 2010:1)

What is “Information structure” anyway? – Conclusion

Properties of information structure:

- **Structuring** of information within a sentence/utterance
- For optimization of information **transfer**
- Between interlocutors in **discourse**

⇒ **“Interface between the grammar of natural language and other cognitive systems while transferring information” (SFB 632 “Information structure”, Potsdam/Berlin)**

- **Abstracting away from speaker intuitions**: “The information structure of a particular clause is determined by the larger sentence or discourse of which it is a part (i.e., its context).” (Foley 1994:1678).
- **IS-Categories are cognitive entities:** Properties of mental representation of entities and situations in a discourse model of a speaker/hearer, which **may be but must not be expressed** cross-linguistically or language internally.

Conclusion – common ground (Krifka 2008)

- Notions of IS are grounded in the phenomenon of information packaging (Chafe 1976) as a response of communicative needs of interlocutors.

⇒ **Model of communication as a continuous change of common ground**

- Distinction between CG content and CG management.
- Notions respond to temporary state of addressee's mind (4) AND change truth conditions (5).

(4) a. A: What did John show Mary?
B: John showed Mary [the PICtures]$_F$.
b. A: Who did John show the pictures? (CG management)
B: John showed [MAry]$_F$ the pictures.

(5) a. John only showed Mary [the PICtures]$_F$.
b. John only showed [MAry]$_F$ the pictures. (CG content)

⇒ **Pragmatic focus** guides direction in which communication should develop.

⇒ **Semantic use of focus** affects truth-conditional content of the CG.

Conclusion – common ground

Role of discourse context and assumption on speaker action (Büring 2003):

(6) a. Informativity:
Don't say known things, don't ask for known things!
b. Relevance:
Stick to a question until it is sufficiently resolved!

- Informativity relates to the common ground
- Relevance assumes an either explicit or implicit Question Under Discussion (QUD) (cf. Roberts 1996)

Information structural categories

Categories – overview

- Common pairs of dimensions of Information structure
  - (i) Focus – background
  - (ii) Given – new
  - (iii) Topic – comment (Krifka 2008)

- Definition of the concepts and examples

- These dimensions are orthogonal to each other

Focus – background

(7) "Focus indicates the presence of alternatives that are relevant for the interpretation of linguistic expressions." (Krifka 2008: 247)

- Along the lines of alternative semantics (Rooth 1992).
- Nothing said about focus marking, i.e. the expression of focus.
- A particular way of marking a focus signals how the alternatives are exploited:
  - Cleft sentences ~ exhaustiveness (≠ in situ focus)
- Languages may vary as to how they mark a focus.

Focus – background: Pragmatic use of focus

- Question-answer pair: question denotes a set of propositions.
- The answer identifies one of these propositions and adds it to the CG content. **Information focus**.

(8) a. Who stole the cookie?
b. $[\text{Peter}]_F$ stole the cookie. (Krifka 2008:250)

- **Correct or confirm information**: Focus alternatives must include a proposition which was proposed in the immediately preceding CG.

(9) a. Mary stole the cookie.
b. (No,) $[\text{PEter}]_F$ stole the cookie!
c. Yes, $[\text{MAry}]_F$ stole the cookie. (Krifka 2008:252)

- Highlighting parallels in interpretations (p.252)

(10) MAry stole the COOkie and PEter stole the CHOcolate.

Focus – background: Semantic effect of focus

- Semantic operators whose interpretational effects depend on focus are associated with focus.
- **Only**: Focus denotation is the only one among the alternatives that leads to a true assertion

(11) a. John only showed Mary [the PICtures]$_F$.
b. John only showed [MAry]$_F$ the pictures.

- Additive focus particle restricts the input CG, impose presuppositions (p. 253)

(12) [JOHN]$_F$ stole a cookie, and [PEter]$_F$, TOO, stole a cookie.

- Focus particle takes scope over focus:

(13) John only introduced Mary to Sue.
- only Mary / only Sue / only introduced / only introduced Mary to Sue
- *only John (no c-command)

Information status – dimension of given–new

Halliday (1967):

New information is “not being recoverable from the preceding discourse.” (204)

Given information “is offered as recoverable anaphorically or situationally.” (211)

(14) Q: Who painted the shed yesterday?

A: // **John** painted the shed yesterday // (p.207)

→ (painted the shed yesterday)$_{given}$

HOWEVER, Halliday views new information in relation to focus: “what is focal is ‘new’ information” (p.204) (“information focus”), and given information in relation to the background.

Prince (1981):

Three-way distinction of “familiarity scale”: new – inferable – evoked (given)

Clark & Haviland (1977) propose the “given-before-new” order.

Information status – dimension of given–new

Given: "denotation of an expression is present in the immediate CG content" (Krifka 2008:262)

(15) A feature X of an expression α is a Givenness feature iff X indicates whether the denotation of α is present in the CG or not, and/or indicates the degree to which it is present in the immediate CG. (p.262)

- This definition makes reference to **degrees of givenness**.
- Indication: Deaccentuation (16a), deletion (b), word order (c)

(16) a. Ten years after John inherited an old farm, he SOLD [the shed]$_{Given}$.
b. Bill went to Greenland, and Mary did ___ too.
c. Bill showed the boy a girl.
*Bill showed a boy the girl.
Bill showed the girl to a boy. (given ~ indefinite)

- Relation between focus and givenness:

(17) A: I know that John stole a cookie. What did he do then?
B: He [reTURNED [the cookie]$_{Given}$]$_{Focus}$ (Krifka 2008:264)

Newness & focus are different cognitive notions

Contrary Halliday (1967):

- Theory: Krifka (2008), Féry & Krifka (2008); Selkirk (2008)
- Acoustics: Katz & Selkirk (2011);
- SOF: Féry & Ishihara (2009), Beaver et al. (2007)
- Processing: Chen et al. (2012 eye-tracking, 2014 ERP)

(18) a. Jane could not get the soap on the top of the shelf.
b. It was **Tom** who helped her.

(19) Jane went shopping with **Tom** and others. She could not get the soap on the top of the shelf. It was **Tom** who helped her.

<Tom> represents the focus and is new in (18b).

<Tom> is given and represents the focus with context (19).

Processing: Chen et al. (2012 eye-tracking, 2014 ERP)

Condition	Context	Target sentence
New/focus	Heren was persuading his friends to go on an outing. (He) ignored that the weather forecast had predicted a bad weather.	At that time it was **Zhongying** (who) opposed him reasonably.
New/non-focus	Heren was persuading his friends to go on an outing. (He) ignored that the weather forecast had predicted a bad weather.	At that time **Zhongying** opposed him reasonably
Given/focus	Heren was persuading **Zhongying** and others to go on an outing. (He) ignored that the weather forecast had predicted a bad weather.	At that time it was **Zhongying** (who) opposed him reasonably.
Given/non-focus	Heren was persuading **Zhongying** and others to go on an outing. (He) ignored that the weather forecast had predicted a bad weather.	At that time **Zhongying** opposed him reasonably

Processing: Chen et al. (2012 eye-tracking, 2014 ERP)

Eye-tracking in reading:

- focused information took less time to read than non-focused information
- new information took longer to read than given information

(First fixation, gaze duration, total time, total number of fixations)

⇒ **processing pattern of focus was different from that of newness**

ERP in reading / comprehension:

- Focus shows a larger P2, larger positivity than non-focused words, reflecting attention allocation and immediate integration of focused information.
- New words show larger N4, smaller LPC than given words, reflecting difficult integration or memory retrieval of new information.

⇒ **differences in processing patterns between focus and newness**

Focus and newness are different concepts (cf. Féry & Krifka 2008) that relate to different aspects of cognitive processing.

Topic – comment

For an overview see van Kuppevelt (1994)

Topic: "the entity that a speaker identifies about which then information, the comment, is given." (Krifka 2008:265)

(20) "The topic constituent identifies the entity or set of entities under which the information expressed in the comment constituent should be stored in the CG content." (p. 265)

- "File-card-like" structure of information storage
- Testing the status of an entity as aboutness topic:
  - *"as for"*-paraphrase, *about*-paraphrase

(21) a. [Aristotle Onassis]$_{Topic}$ [married Jacqueline Kennedy]$_{Comment}$. (p.265)
b. As for Aristotle Onassis, he married Jacqueline Kennedy.

- Topics frequently refer to given or inferable constituents in discourse, BUT may be new as well, introducing a new discourse referent:

(22) [A good friend of mine]$_{Topic}$ [married Britney Spears last year]$_{Comment}$. (p.265)
---------- new ----------

Topic – comment

- Confusion with focus–background structure, BUT a comment must not be identical to the focus:

(23) A: When did [Aristotle Onassis]$_{Topic}$ marry Jacqueline Kennedy?
B: [He]$_{Topic}$ [married her [in 1968]$_{Focus}$]]$_{Comment}$.

- A topic may contain a focus, thus rendering it as a contrastive topic (cf. also Büring 1997, 2003; Gast 2010). The focus indicates an alternative aboutness topic.
Function: incremental update in the CG management.

(24) A: What do your siblings do?
B: [My [SISter]$_{Focus}$]$_{Topic}$ [studies MEDicine]$_{Focus}$, and
[my [BROther]$_{Focus}$]$_{Topic}$ is [working on a FREIGHT ship]$_{Focus}$.

- A sentence needs not to have a topic – “thetic sentence”

(25) [The HOUSE is on fire]$_{Comment}$. (p.267)

Elicitation of IS

Elicitation of information structure

Eliciting information structure means to elicit both 'mental states' of speakers and hearers and the linguistic means used to convey these mental states (Skopeteas et al. 2006).

The classical test is to use mini-dialogues such as question-answer pairs (cf. Paul 1919, Krifka 2008), where the answer indicates a correspondence between the focus (F) and the information being questioned. The focus denotes the set of alternatives.

(26) A: What did John show Mary?
B: John showed Mary [the PICtures]$_F$.

The linguistic means used for expressing the focus in (26) is in intonation, i.e. a pitch accent on the focused constituent.

However, information structure is more than creating a mini-dialogue!

Elicitation of information structure – QUIS

QUIS – Questionnaire of Information Structure:

> "This bulky manual contains a questionnaire for the investigation of information structure from a typological perspective. It provides a tool for the collection of natural linguistic data, both spoken and written, and, secondly, for the elaboration of grammars of information structure in genetically diverse languages."
> (Skopeteas et al. 2006: 1)

- QUIS contains descriptions of tests that aim at eliciting spontaneous sentences or short dialogues with specific information structural content (p.6)
- Materials contain pictures, playing card, short films, translation tasks

Elicitation of information structure: Picture naming task (Genzel & Kügler 2010a)

- Pre-recorded questions to avoid variation of experimenter:
  What do you see on this picture?
  Whom did Agyeman/Anum help this morning?
  Did Agyeman help Anum this morning?

  (cf. e.g. Calhoun to appear for similar tasks)

Elicitation of information structure: Picture naming task (Genzel & Kügler 2010a) – Akan

Akan is a SVO language (Kobele &Torrence 2006).

(27) kòfí bòò àmà
Kofi hit.PST Ama 'Kofi hit Ama'

According to Boadi (1974) a FM is associated with each sentence node, and the focused element is copied into the sentence initial position.

(28) a. me na me baa ha nɛra
I FM I come.PST here yesterday
'I it was who came here yesterday.'

b. ha na me baa nɛra
here FM I come.PST yesterday
'It was here that I came yesterday.'

c. nɛra na me baa ha
yesterday FM I come.PST here
'Yesterday it was that I came here.'

Elicitation of information structure: Picture naming task (Genzel & Kügler 2010a) – Akan

Akan is a SVO language (Kobele &Torrence 2006).

(27) kòfí bòò àmà
Kofi hit.PST Ama 'Kofi hit Ama.'

Focus is syntactically expressed ex-situ, and obligatorily marked by a FM *nà*. A cleft construction may optionally be used.

(29) Object focus (Boadi 1974; Ermisch 2006; Kobele &Torrence 2006:164; Marfo & Bodomo 2005; Saah 1988)
(ɛ-yɛ) àmà nà kòfí bòò
it-is Ama FM Kofi hit.PST 'It is Ama who Kofi hit.'

According to Marfo & Bodomo in-situ focus realisation is not possible:

> **"Contrastive focus is only realized through constituent fronting in Akan." (Marfo & Bodomo 2005:187)**

Elicitation of information structure: Picture naming task (Genzel & Kügler 2010a) – Akan

Akan is a SVO language (Kobele &Torrence 2006).

(27) **kòfí bòò àmà**
Kofi hit.PST Ama 'Kofi hit Ama.'

However, focus can be realised in its base position (*in-situ*) as well (Saah 1988).

(30) **Object focus**
kòfí bòò àmà (nà)
Kofi hit.past Ama (FM) 'Kofi hit AMA.'

The picture naming task confirmed data such as in (4).

(31) **What did Anum buy this morning? / Did Anum buy fish this morning?**

-- no prepared answers to elicit speakers' most frequent focus strategy.

-- questions for 2 target words, answered by 11 speakers

-- narrow focus: **17 in-situ** 2 ex-situ 3 other

-- contrastive focus: **14 in-situ** 3 ex-situ 5 other

(Genzel & Kügler 2010a; Kügler & Genzel 2012)

Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya

- Question-answer task to elicit different focus types induced by different questions.

Yucatec Maya Syntax

- Head marking VOS language (Durbin & Ojeda 1978)

(32) t-u hàant-ah òon Pedro.
pfv-a.3 eat:trr-cmpl(b.3.sg) avocado Pedro
'Pedro ate avocado.'

- Focus position (Bricker 1979; Kügler, Skopeteas & Verhoeven 2007)

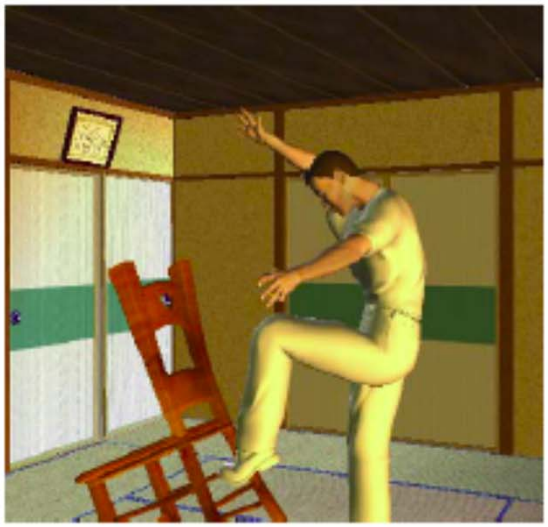
(33) òon t-u hàant-ah Pedro.
avocado pfv-a.3 eat:trr-cmpl(b.3.sg) Pedro
'It was an avocado, that Pedro ate.'

Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya

- Three factors are manipulated
  - Focus constituent (agent / patient focus)
  - Types of focus (confirmative, completive, selective, corrective)
  - Animacy (animate / inanimate patient)
- Task: memorizing 4 pictures for 60 seconds, asking questions
- Instructions:
  "We are going to do a memory test. You may look at these pictures for 60 seconds. After this very short time, I will take the pictures back, and I will ask you about different details in them. Please try to answer my questions in full sentences, and not in short answers, e.g., "yes", "no", "the boy", etc."

Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya

Sheet 1: Woman hitting man, girl hitting boy, man kicking chair, man pushing car



Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya

Four sessions:

Confirmation:
There, where the blue sky is: Is a woman hitting the man?

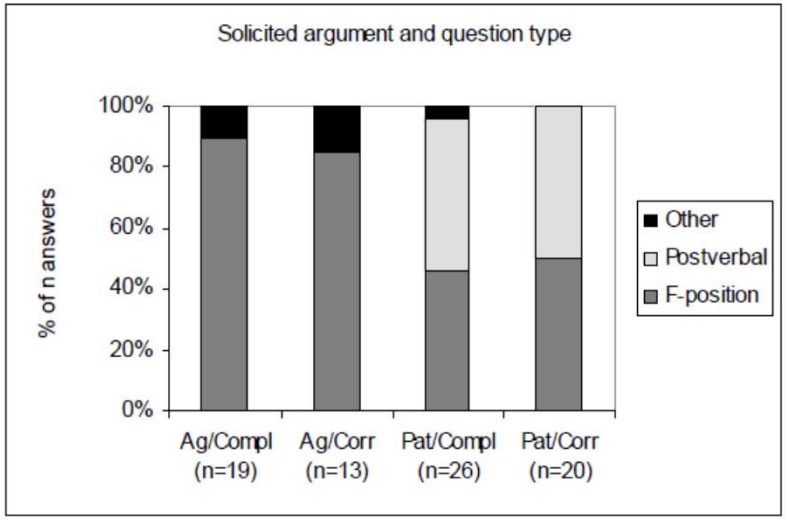
Selection:
There, where the blue sky is: Is a man or a woman hitting the man?

Correction:
There, where the blue sky is: Is a man hitting the man?

Completion:
There, where the blue sky is: Who is hitting the man?

The cards vary animacy (woman hitting man / man kicking chair) and agent/patient (woman hitting / man gets hit).

Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya



Preverbal:

a. A-focus
Q= Who is looking at the girl?
hun-túul xibpal pak-t-ik
one-CL.AN man:child see-TRR-INCMPL
le x-ch'úuppal-o'.
DEF F-woman:child-D2
'It is a boy that is looking at the girl.'

b. P-focus
Q= What is the man kicking?
hun-p'éel esten... k'áanche' k-u
one-CL.INAN HESIT chair IPFV-A.3
kóochek'-t-ik le xìib-o'.
kick:foot-TRR-INCMPL DEF man-D2
'It is a chair that the man is kicking.'

Postverbal:

Q= Is the man kicking a table?
le xìib-o' túun kóochek'-t-ik
DEF man-D2 PROG:A.3 kick:foot-TRR-INCMPL
hun-p'éel silla
one-CL.INAN chair
'The man is kicking a chair.'

Elicitation of information structure: Anima (Kügler et al. 2007) – Yucatec Maya

Asymmetry in the encoding of agents and patients

- Agents: almost always in preverbal focus position
- Patients: both preverbal and postverbal position
  → in situ focus of patients
- Type of focus has no impact on syntactic position

General preference for Agent first encoding in Yucatec Maya.

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Two picture naming tasks – I syntax, II prosody:

- Eliciting of focus structures via context-questions and context-statements
- Mandarin Chinese
  - Focus is prosodically (Xu 1999) and syntactically (Li 2008) marked
  - Counter-presuppositional focus seems to be marked prosodically and syntactically (Greif 2012)
- Manipulating the context: Question vs. Assertion

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Prosody – four tone language (1–high, 2–rising, 3–low, 4–falling tone)

- Focus expands pitch register (Xu 1999) and increases duration (Chen 2006)
- Counter-presuppositional focus: raised pitch span, longer duration (Greif 2012)

(34) Narrow corrective focus / question-context

a. Does Xiaxia have mangos? {Xiaxia has mangos, Xiaxia has no mangos}

b. Mulei has mangos. Confirmation of 2nd presupposition, correction.

(35) Counter-presuppositional focus / statement-context

a. Xiaxia has mangos. {Xiaxia has mangos}

b. Mulei has mangos Correction of presupposition.

Syntax – SVO

- Focus in situ (see e.g. data in Xu 1999)
- Cleft structures in corrective and counter-preuppositional focus (Li 2008, Greif 2012)

(36) It is Luwei who has litchis

shi4 lu4wei1 you3 li4zhi1

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Target words (subjects)

洛雅luo4ya3

魏娜wei4na4

陆薇lu4wei1

穆蕾mu4lei2

Objects

杨梅 bayberry

荔枝 litchi

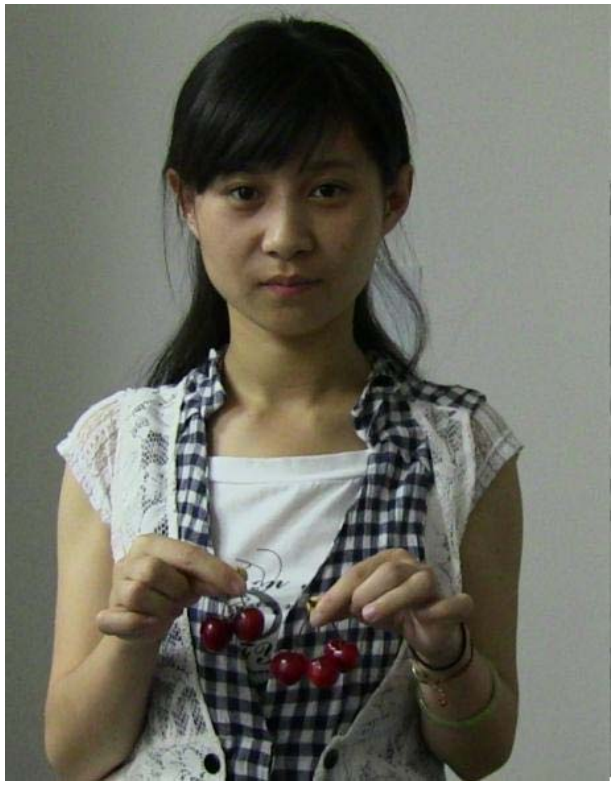
芒果 mango

樱桃 cherry

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

简单描述下面的图片

Give a brief description of the picture below.



魏娜 (Weina)

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Sound: Chenxia has bananas.

Sound: Is it Chenxia who has bananas?

苗苗Miaomiao

陈霞Chenxia

夏夏Xiaxia

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Experiment I – syntactic preference

Instructions:

1. Your task is to describe the picture as in the examples
2. Some slides contain a question. Respond to the sound you have heard according to the pictures.

No Priming!

Experiment II – prosodic realization

Instructions:

1. Your task is to describe the picture as in the examples. Look at the examples carefully.
2. Some slides contain a question. Your task is to answer the questions as in the examples. Respond to the sound you have heard according to the pictures.

Priming – only by visual presentation of a sentence, no sound:

回答：夏夏有桃子。
(Xiaxia has peaches.)

夏夏 (XiaXia)

Elicitation of information structure: Focus cards (Kügler & Genzel 2014) – Mandarin

Effect of focus

- Broad focus – 100% *in situ* subjects
- Corrective focus – 84% *in situ* subjects
- Prosodic pitch register expansion in focus (cf. Xu 1999)

Effect of context

- Statement – 92% *in situ* subjects
  (8 instances of shi4-clefts, realized by one speaker)
- Questions – 76% *in situ* subjects
  (23 instances of shi4-clefts, realized by three speakers including the one using clefts in statement contexts)
- No prosodic effect of context

Linguistic means to express IS

Linguistic means to express IS

Languages use different linguistic means such as phonology, syntax, morphology or a combination thereof to express an information structural category. (Zimmermann & Onea 2011:1658)

- IS **categories** are assumed to be cognitive universals.
- Grammatical **realization** of IS categories is subject to cross-linguistic variation.
- There is no one-to-one correspondence between IS category and its linguistic realization.
  (Krifka 2008, Féry 2008, Zimmermann 2008, Féry & Krifka 2008, Zimmermann & Féry 2010)

Linguistic means to express IS

Languages use different linguistic means such as phonology, **syntax**, morphology or a combination thereof to express an information structural category. (Zimmermann & Onea 2011:1658)

- Syntax – clefting / constituent fronting / pre-verbal position

(37)a. shi luwei you si ge lizhi
SHI Luwei has four QUANT. litchis
'No, it is Luwei who has four litchis.'
(Mandarin, Kügler & Genzel 2014)

b. Amango na Anum tɔ-ɔ anɔpa yi.
mango FM Anum buy-past morning this
'It is a mango that Anum bought this morning.'
(Akan, Kügler & Genzel 2012)

c. òon t-u hàant-ah Pedro.
avocado PFV-A.3 eat:TRR-CMPL Pedro
'It was (an) avocado that Pedro ate.'
(Yucatec Maya, Kügler, Skopeteas & Verhoeven 2007)

Linguistic means to express IS

Languages use different linguistic means such as phonology, syntax, **morphology** or a combination thereof to express an information structural category. (Zimmermann & Onea 2011:1658)

- Morphology – focus marker / topic marker

(38)a. Q: WHAT is he chewing?
A: Tɪ ba wum-a kwalɪngala.
3SG PROG chew-FOC colanut
'He is chewing COLANUT'.
(Focus particle "–a", Guruntum, Hartmann & Zimmermann 2009)

b. Pedro-e' t-u haant-ah oon.
Pedro-D3 PFV-A.3 eat:TRR-CMPL avocado
'As for Pedro, he ate avocado.'
(Topic marker "–e' ", Yucatec Maya, Kügler et al. 2007)

Linguistic means to express IS

Languages use different linguistic means such as **phonology**, syntax, morphology or a combination thereof to express an information structural category. (Zimmermann & Onea 2011:1658)

- Phonology – pitch accent / phrasing

(39)a. Q: The wether wanted to present the buck to the lion.
Why didn't he do this?

H*L

A: Weil der Hammel den Rammler dem **HUMMER** vorgestellt hat.
'Because the wether presented the buck to the lobster.'
(Féry & Kügler 2008; cf. Baumann et al. 2006)

b. (Anamenya nyumba ndi mwa**a**la)φ All-new
s/he hit house with stone
Q: What did he hit with a stone?'
A: (Anamenya nyu**u**mba)φ (ndi mwa**a**la)φ Object-focus
's/he hit house with stone.'
(Antepenultimate lengthening in Chichewa, Kanerva 1990;
cf. Zerbian 2006, Downing & Pompino-Marschall 2013)

Syntactic expression of IS

Linguistic means – syntax

Obligatory syntactic focus marking languages

- Prominent example: Hungarian (Kiss 2002); cf. Yucatec Maya (Kügler et al. 2007, Kügler & Skopeteas 2007)

Syntactic focus marking languages ~ correlation with prosodic marking, e.g. Germanic languages

- Prosodically driven syntactic movement: prosodic prominence of the right edge drives given constituents to the left (e.g. Fanselow to appear).
- Focus may be realized in-situ, probably because focus is realized by prosodic prominence (no need to assume a particular focus position).

(40) When did he write the letter? Ich denke, "I think"
a. dass er GESTERN den Brief schrieb. (canonical order)
b. dass er den Brief GESTERN schrieb.

- Indirect effect of IS on syntax: The prosodic need to align a focused constituent with the right-most prosodic prominence drives syntactic movement.
(cf. Samoan, Calhoun to appear; Romance languages, Remberger 2010, Jones 2013, Vanrell & Férnadez Soriano 2013)

Word order effects of givenness (Skopeteas & Fanselow 2010)

- Testing the "given-before-new" principle (Clark & Haviland 1977)
- QUIS task "Sequence"
  - 1. An individual is introduced. 2. Individual involved in an event (e.g. "a boy hitting a man on the shoulders")
  - Elicitation of transitive verbs with two arguments
  - One argument = new, one arg. = given;
- Object-fronting strategy (6/12 languages)

(41) a. [sc1] {A man is walking …}
[sc2] k'ac-i kal-s e-kač-eb-a
man-NOM woman-DAT OV-move.up-PRS.3SG
'… the man is lifting a woman.'
condition: agent/given; S > O; 100%

b. [sc1.] {There is a box on the table …}
[sc2.] … qut-s k'ac-I a-gd-eb-s
box-DAT man-NOM NV-throw-PRS.3SG
'… a man is throwing the box.'
condition: patient/given; O > S; 39% (p.310f)

Word order effects of givenness (Skopeteas & Fanselow 2010)

- Passivization strategy (5/12 languages)

(42) a. [sc1] {A boy stands on a carpet …}
[sc2] … dieser Junge schubst eine grüne Sektflasche um …
'… this boy pushes a green champagne-bottle ...'
condition: agent/given; agent=subj.; 100%

b. [sc1.] {A girl is running …}
…das Mädchen wird von einem Mann gegriffen und umgeschmissen…
'…the girl is grasped and knocked sown by a man.'
condition: patient/given; agent=non-subj.; 21% (p.321)

- Cross-linguistically, Agent/given licenses canonical word order, Patient/given licenses deviations from canonical order.
- Given-before-new principle shows up empirically.

Topik in Akan (Kügler, in prep)

Topic in Akan appears at the initial sentence position followed by a morphological topic marker (Marfo 2004).

- Syntactic topic-phrase
- Resumptive pronoun in matrix phrase
- Topic phrase constitutes a separate intonation phrase

(43)a. kofi deɛ ɔ-a-ba ha. (SVO, Topic marker)
Kofi TOP 3S.Sbj-PFT-come here
'As for Kofi, he has come here.'

b. kofi, ɔ-a-ba ha.
Kofi 3S.Sbj-PFT-come here (SVO, Topic, no marker)
'Kofi, he has come here.'

c. kofi a-ba ha. (SVO, no Topic)
Kofi PFT-come here

d. [Kofi]ι [he has come here]ι

- Contextual conditions for (43a,b) are unclear, even so prosodic differences.

Subject-Object-Asymmetry

Evidence for a structural asymmetry to mark subjects and non-subjects in West-African languages (Hartmann & Zimmermann 2007a, b; Fiedler et al. 2010), and the Austronesian language Samoa (Calhoun to appear):

- Focused subjects – overt marking (as opposed to a canonical order)
- Focused non-subjects – (objects, adjuncts) may be unmarked

(44) a. Kofi huu **Kwame** wɔ fie hɔ (Who saw Kofi …?)
K. see.PST K. LOC house LOC
'Kofi saw Kwame in the house.'

b. **Kwame** na Kofi huu no wɔ fie hɔ
K. FM K. see.PST PRO LOC house LOC
'It was Kwame that Kofi saw in the house.' (Saah 1988:25; Pfeil 2014:13)

c. **Kofi** na ɔ-huu Kwame wɔ fie hɔ (Who saw Kwame …?)
K. FM PRO-see.PST K. LOC house LOC
'It was Kofi who saw Kwame in the house.'

d. * **Kofi** huu Kwame wɔ fie hɔ.

Subject-Object-Asymmetry

- Cross-linguistic tendency for subjects to be linguistically marked in case of focus
- However, empirical evidence for syntactically in-situ focused subjects without further morphological and/or phonological marking (Genzel 2013, Duah 2014, Pfeil 2014)

(45) a. Hwan na ɔ-ba-a aye no?
Who FM PRO-come-COMPL funeral DET
'Who came to the funeral?'

b. Kofi ba-aaɛ
K. come-COMPL
'Kofi came.'

c. * Kofi na ɔ-ba-aaɛ
K. FM PRO-come-COMPL
'It was Kofi who came.' (Duah 2014)

- In-situ focused subject in non-exhaustive contexts
- Production study confirms this result (Pfeil 2014)

Subject-Object-Asymmetry (Pfeil 2014, MA thesis)

- Production experiment eliciting sentence by means of questions relating to situation on pictures (cf. Kügler & Genzel 2014)
- Eliciting subject focus by exhaustive/ non-exhaustive contexts

(46)a. Exhaustive context
Hwan na o-kura kwadu ne?
Who FM PRO-hold banana PRO
'Who holds the banana?' (3 pictures, 1 with the mentioned fruit)

b. Non-exhaustive context
Sara kura aborɔbɛ. Hwan bio na o-kura aborɔbɛ?
S. hold pineapple who also FM PRO-hold pineapple
'Sara holds a pineapple. Who else holds a pineapple?'
(3 pict., 2 pictures with the mentioned fruit)

Category	Condition	ex situ	in situ	other	Total
Exhaustivity	exhaustive	40	4	0	44
	non-exhaustive	7	4	33	44

- Exhaustivity constraints in-situ/ex-situ realization of focus!

Prosodic expression of IS

Linguistic means – prosody

- Prosodic demands drive syntactic movement.
- Prosody signals IS-categories by means of tones, pitch accent type, pitch register, and/or phrasing, yet languages differ in their expression of IS-categories (Kügler 2011; cf. Burdin et al. to appear).
- The function of prosodic focus marking is to highlight the focus. It is the deviation from a neutral register that fulfills this function, no matter the direction of deviation (Kügler 2011).
- Nuclear pitch accent placement is governed by focus (Gussenhoven 1984).
- The degrees of givenness (information status) correlate with degrees of prosodic prominence (Baumann 2006, Baumann & Grice 2006, Röhr & Baumann 2011)

Intonation and focus marking – Overview

Languages use different prosodic means for encoding focus:

1. Tonal means:
   - Generally a register raising, found in intonation (e.g. German, Féry & Kügler 2008; Baumann et al. 2006) and tone languages (e.g. Mandarin Chinese, Xu 1999)
   - Different phonological tone / accent (e.g. European Portuguese, Frota 2000)
2. Phrasal means:
   - Insertion of a phrase break after a focused constituent, Bantu languages (e.g. Chichewa, Downing & Pompino-Marschall 2013, Downing 2008), and Kwa languages (Leben & Ahoua 2006). Overview: Féry (2013)
3. No prosodic means:
   - No register raising, no phrase boundary insertion (e.g. Yucatec Maya, Kügler & Skopeteas 2007, Northern Sotho, Zerbian 2006; overview in Zerbian, Genzel & Kügler 2010).

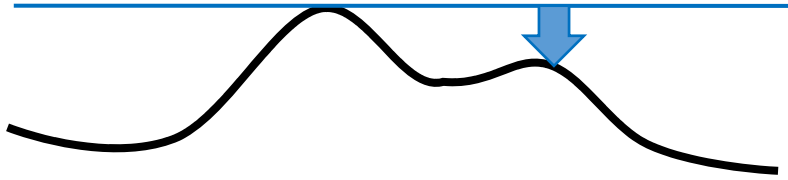
Prominence in intonation languages

Intonation highlights information.

Prominent information (focus) raises pitch register on focused constituent and increases duration.

(47)

A: Erzähle mal, was ist los!

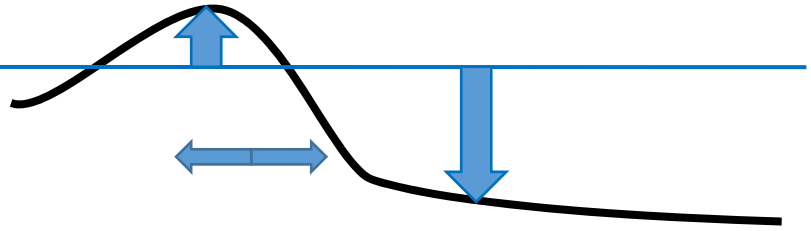


B: Frau **Liehner** will **Blumen** malen.
L*H **H*L**

Braod focus

(48)

A: Wer will Blumen malen?



B: **Frau Liehner** will Blumen malen.
H*L

Narrow focus

(Féry & Kügler 2008; Kügler 2008; Baumann et al. 2006)

Intonation and prominence – German (Féry & Kügler 2008)

Realization of focus in intonation languages may occur at any sentence position, no effect of word order variation

Factors in a production study:

- Information structure (wide focus, narrow focus on arguments)
- Number of arguments in a sentence
- word order

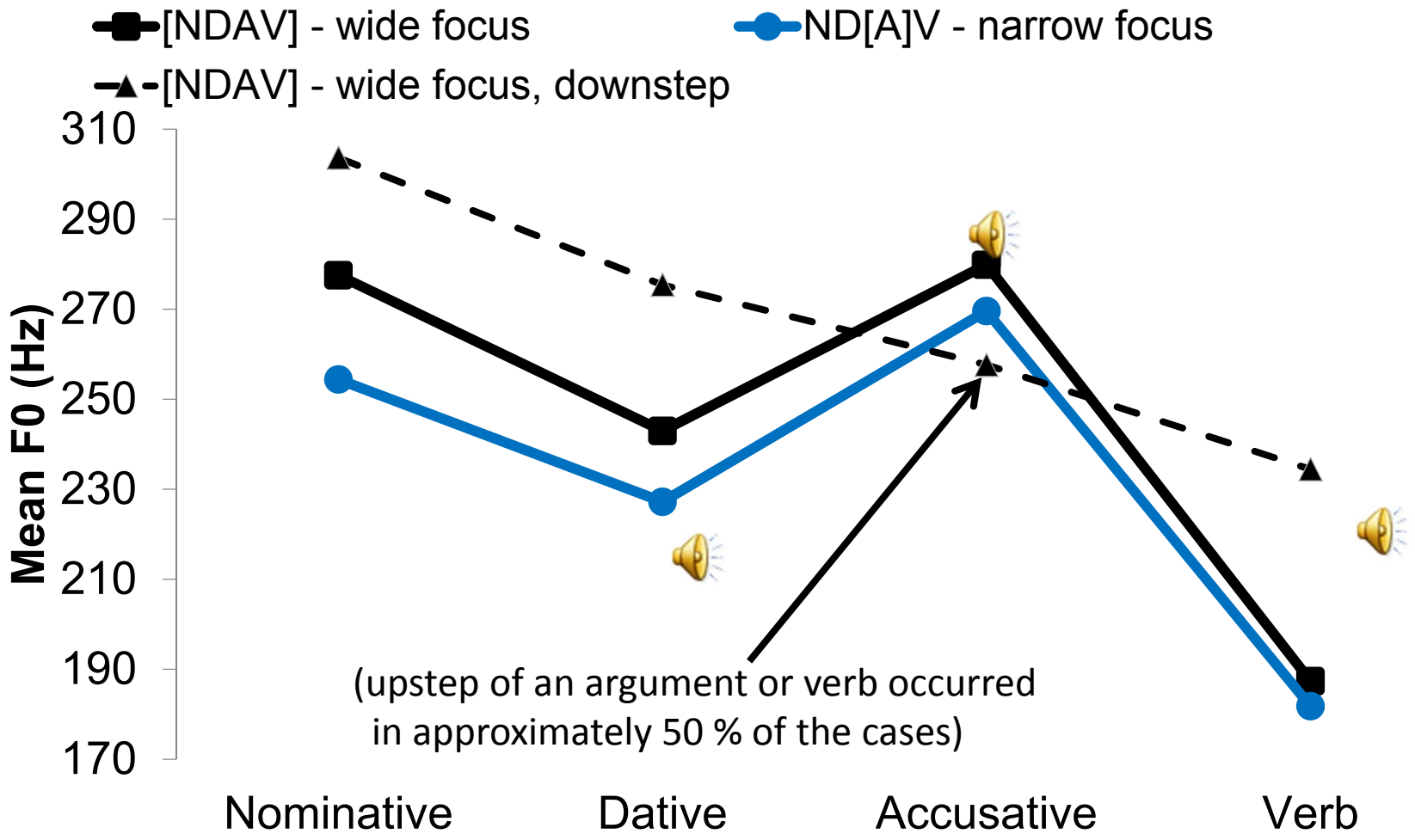
Speech materials, example:

The sheep wanted to introduce the buck to the lion. Why didn't he do this?

Weil der Hammel den Rammler dem Hummer vorgestellt hat.

'Because the sheep introduced the buck to the lobster.'

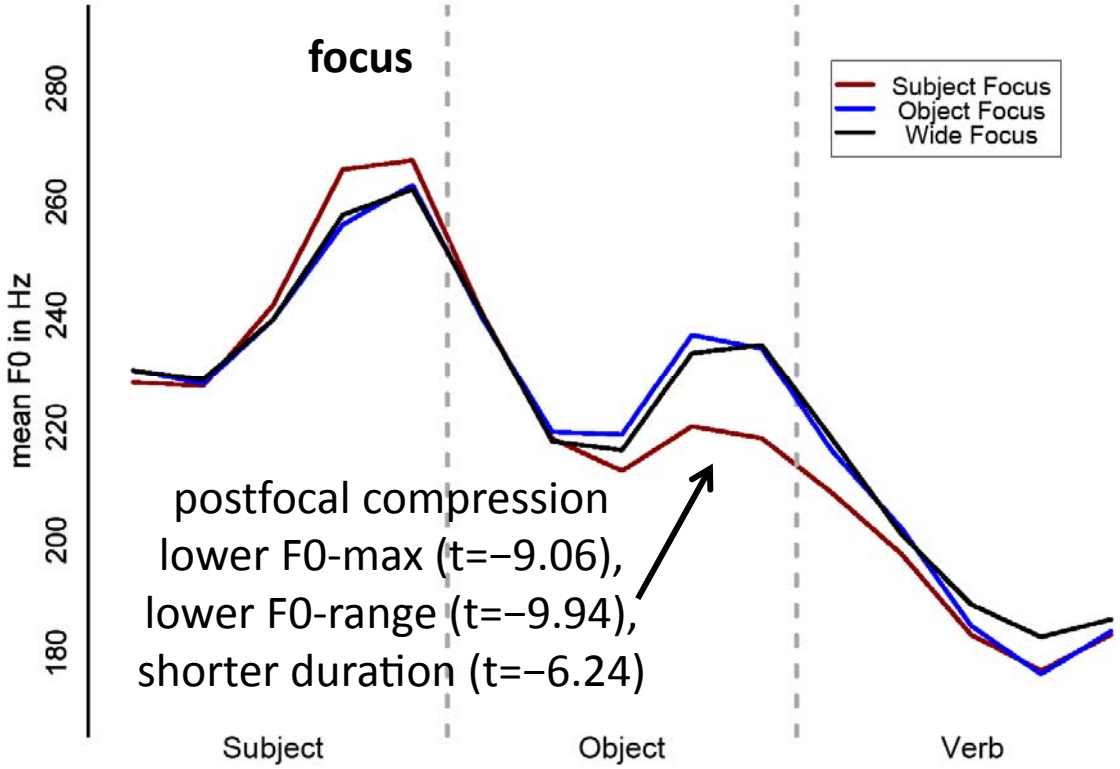
Intonation and prominence – German (Féry & Kügler 2008)



Variation is perceptually attested (Kügler & Gollrad submitted; also in speech synthesis, Kügler et al. 2013)

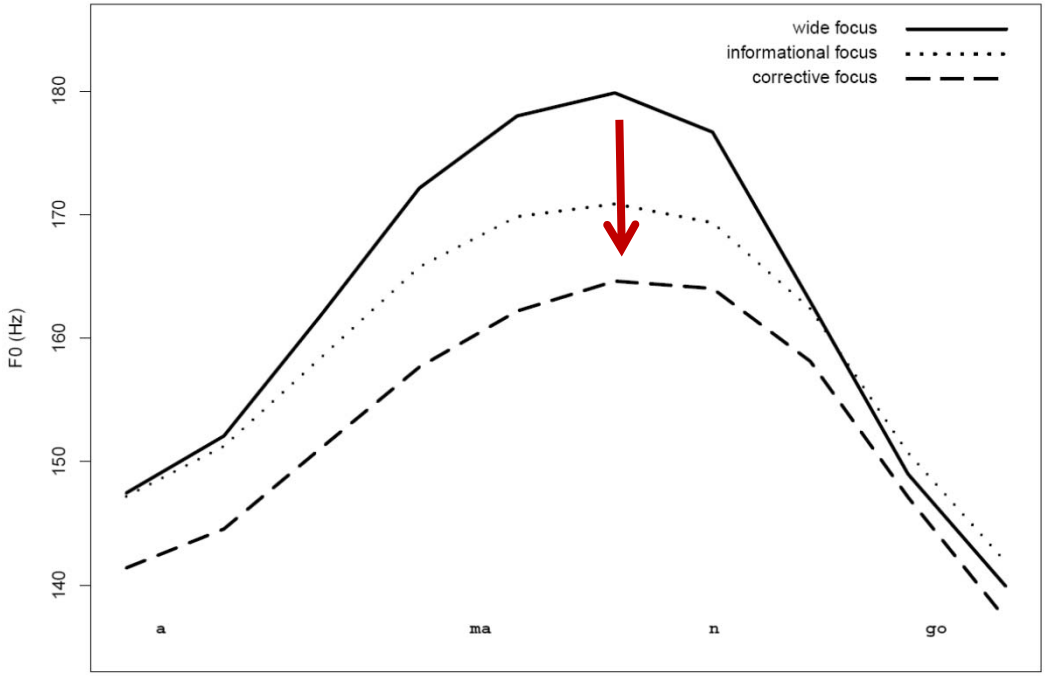
Intonation and prominence – Hindi

(Patil, Kentner, Gollrad, Kügler, Féry, Vasishth 2008)



- Downstep
- No register raising (but increased pitch span under focus, Genzel & Kügler 2010b)
- Post-focal register compression

Intonation and prominence – Akan (Kügler & Genzel 2012)



Interaction of focus and syntactic position

Factors (3 x 2):
- broad, narrow and corrective focus
- syntactic position (in-situ, ex-situ focus)

Δc of lowering in (st)			
item	broad - narrow	broad - contrastive	narrow - contrastive
(1) amango in - situ	**0.8**	**1.6**	**0.7**
(2) amango ex - situ	**0.3**	**1.8**	**0.5**

⇒ **Deviation from a neutral register, no matter what direction!**

Intransitive verbs & nuclear stress (Verhoeven & Kügler 2014)

- Sentence accent assignment rules determine accent placement (Gussenhoven 1984).
- Two prosodic structures in simple sentences with an intransitive verb and an argument:

(49)a. MARY *is coming.*
b. *Mary is* SINGING*.*
(Chafe 1974:115, Schmerling 1976, Sasse 1987: 520, Jacobs 2001: 645f)

(50)	Was ist denn hier los?	'What's the matter?'	
a.	*LENA ist eingetroffen.*	*'LENA arrived.'*	unacc.
b.	*Ein MINISTER ist eingetroffen.*	*'A MINISTER arrived.'*	unacc.
c.	*Lena hat GERAUCHT.*	*'Lena SMOKED.'*	unerg.
d.	*Ein Minister hat GERAUCHT.*	*'A minister SMOKED.'*	unerg.

Predictability and intransitive verbs (Verhoeven & Kügler 2014)

Conflict cases: nuclear stress on the subject with highly predictable unergative verbs

(e.g. Gussenhoven 1984: 40, Krifka 2008, Uhmann 1991, Féry 1993: 32)

(51)	a.	*Was ist das*?	*'What's that?'*
	b.	*Ein HUND bellt.*	*'A DOG is barking.'*
		Eine BIENE summt.	*'A BEE is buzzing.'*

Test sentences:

(52)	Warum waren alle so beunruhigt?	'Why was everybody so worried?'
	a: Weil ein Baby geweint hat.	'Because a baby cried.'
	b: Weil eine Angestellte geweint hat.	'Because an employee cried.'

- Manipulation of NUCLEAR ACCENT PLACEMENT (Subject vs. Verb) and PREDICTABILITY of verb (predictable vs. unpredictable)

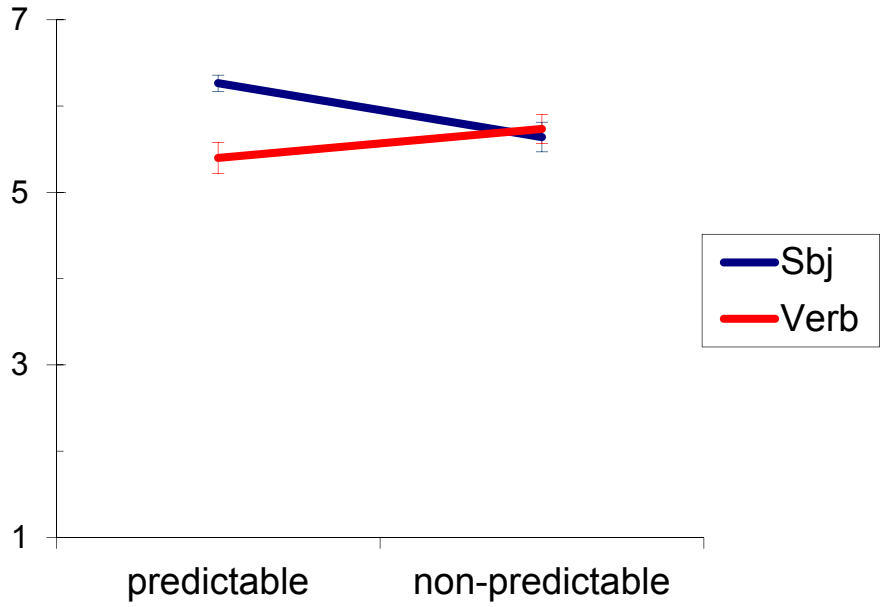
Does predictability account for the unexpected accentual pattern?

Predictability and intransitive verbs (Verhoeven & Kügler 2014)

Auditory semantic congruency study

Results: Unergative verbs with accent on S or V

Accent on Subject with predictable Verb sig. more acceptable.



stress:	$F_{1,31} = 4.8$; $p < .05$	$F_{1,15} = 7.7$; $p < .05$
predictability :	*	*
predictability × stress:	$F_{1,31} = 13{,}2$; $p < .001$	$F_{1,15} = 12{,}5$; $p < .003$

Information status and prosody

- New information tends to be accented, given information tends to be unaccented – if at all only in post-focal position (but see Riester & Piontek accepted)
- "accessible information cannot be treated as a uniform category." (Baumann & Grice 2006)

⇒ **different degrees of givenness (cf. Krifka 2008)**

Type of accessibility	Pitch accent type preferences	Preference values for deaccentuation of target referent	
Converseness	No accent ≫ H+L* > H*	−1.18	
Part-whole	No accent ≫ H+L* ≫ H*	−0.84	Higher preference
Synonymy	No accent ≫ H+L* > H*	−0.68	
Hyponym-hypernym	No accent ≫ H+L* ≫ H*	−0.67	
Hypernym-hyponym	No accent ≫ H+L* > H*	−0.55	
Textually displaced	H+L* = no accent ≫ H*	−0.18	
Whole-part	H+L* ≫ H* = no accent	0.01	Lower preference
Scenario	H+L* > H* = no accent	0.09	

Annotation of IS

Annotation

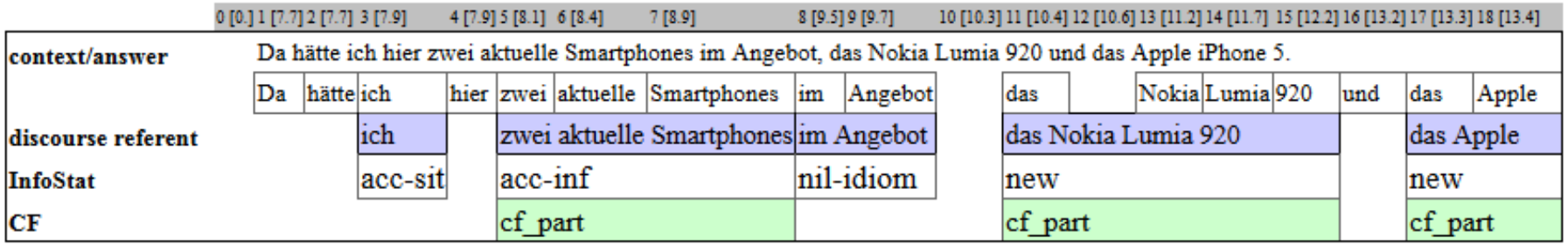
However, information structure is more
than creating a mini-dialogue!

- **Experimental data vis-à-vis naturally occurring speech:**
  Well-controlled experiments serve to capture effects of information structure (e.g. QUIS).
  Naturally occurring speech (e.g. speech corpora) may reflect interlocutor's mental states and discourse structure, which relates to the common ground management.
- Information structure categories should thus be annotated, just as part-of-speech or prosody (in terms of pitch accents and phrasing) is annotated in speech data.
- Having established clear and well-defined concepts of IS-categories (e.g. Krifka 2008), the SFB 632 proposed guidelines for IS-annotation (Dipper et al. 2007; cf. also RefLex Annotation Scheme, Baumann & Riester 2012).

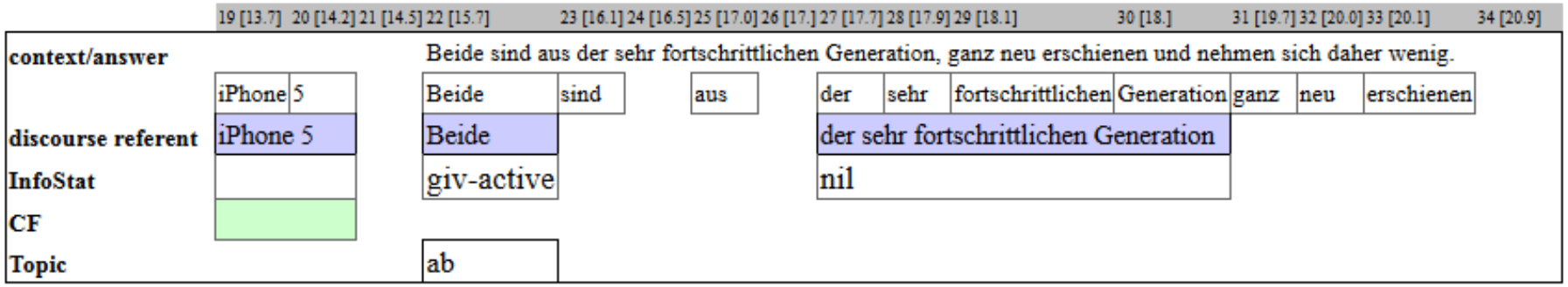
“Mobile phone corpus” – SFB 632 project T2

Smolibocki, Kügler & Stede

- Corpus is based on advisory monologues in the context of mobile phones.
- Monologues from 2 professional salesmen on request of a customer.
- Overall, 13 different monologues were recorded by two speakers (7 / 6).
- Six different topics, e.g. multimedia or business applications of mobile phones
- Mean duration of each recording: ~ five minutes of spontaneous speech.
- IS-annotated according to SFB 632 Annotation Guidelines (Dipper et al. [1]2007), prosodic annotation with GToBI (Grice et al. 2005).



[2]



Information status – *acc-inferable* (guidelines)

- assign ‘acc-inf’, if the referent is part of one of the following bridging relations:

1) **part-whole:** The referent is in a part-whole relation to a referent in the preceding discourse.

Context: ‘The garden’ has been mentioned before

<WORDS>	The	garden	is	beautiful	.	**Its**	**entrance**	is	just	across	this	river	.
<CS>	NP					NP					NP		
<GIVEN>	giv-act					**acc-inf**					acc-sit		

Information status – *acc-inferable* (guidelines)

2) set-rel: The referent is part of a set relation (i.e. subset, superset, member-of-the-same-set) to a referent in the preceding discourse.

Context: ‘the flowers’ and ‘the garden’ have been mentioned at some distance

<WORDS>	The	flowers	in	the	garden	blossom	.
<CS>	NP			NP			
	NP						
<GIVEN>	giv-inactive			giv-inactive			
	giv-inactive						

<WORDS>	**The**	**flowers**	near	**the**	**gate**	blossom	violet	.
<CS>	NP			NP				
	NP							
<GIVEN>	**acc-inf**			**acc-inf**				
	acc-inf							

Inter-rater Agreement – information status

- Results for three annotators mirror the ones of Ritz et al. (2008), which were based on map task dialogues annotating less categories.
- Results for two annotators show considerable increase of agreement.

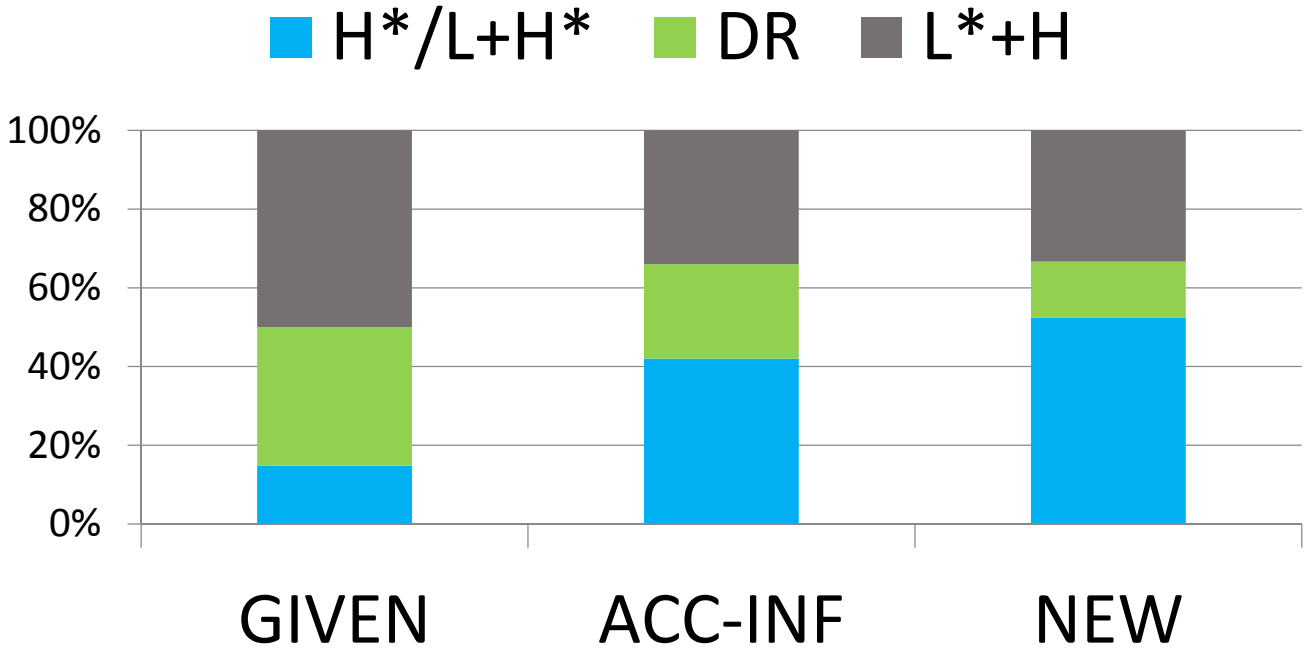
Annotator	Text Type	NPs	κ	
2	Dial (map task)	99	.61	(Ritz et al. 2008)
3	Advisory	463	.62	Mobile phone corpus
2	Advisory	463	.75	

quality of annotation is considered high when κ>.8 and
'allowing for tentative conclusions' .67 < κ < .8 (Carletta 1996)

- Adding more categories in the 2nd edition of the Annotation Guidelines did not decrease the inter-annotator reliability.

Corpus analysis – prosody & information status

- Automatic corpus analysis reveals a lot of variation
- Similar accent distribution for all information status categories

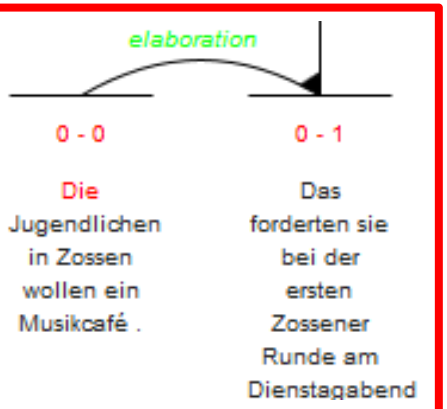


- Corpus data comprises further factors that influence the prosodic realization of discourse referents (cf. Riester & Piontek accepted).

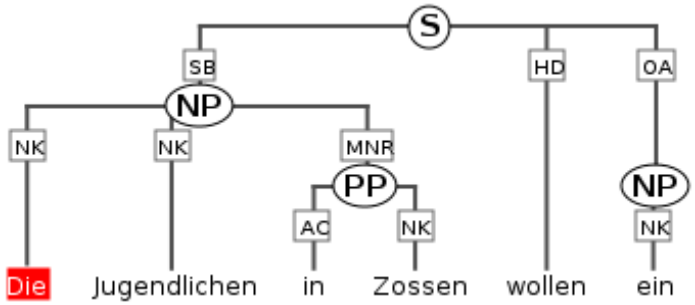
⇒ **Prosodic realization of an utterance is a complex matter, and a single IS-category shows variation as to its prosodic expression**

Data pluriverse

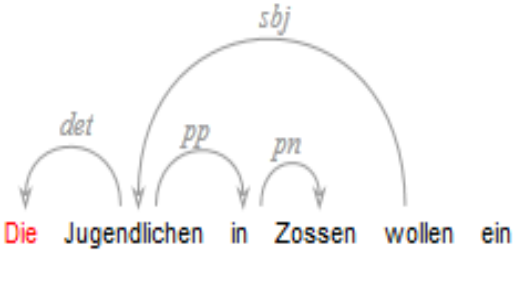
http://www.sfb632.uni-potsdam.de/d1-annis.html



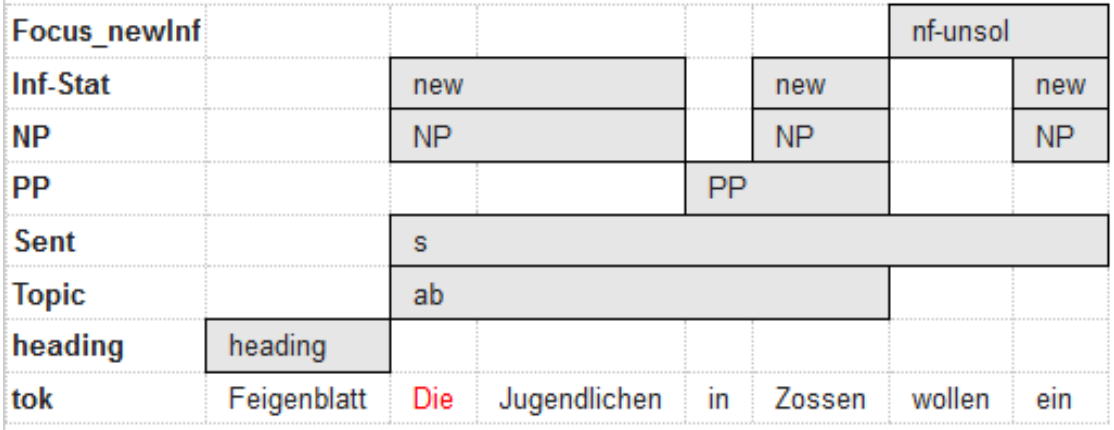
rhetorical structure



constituencies



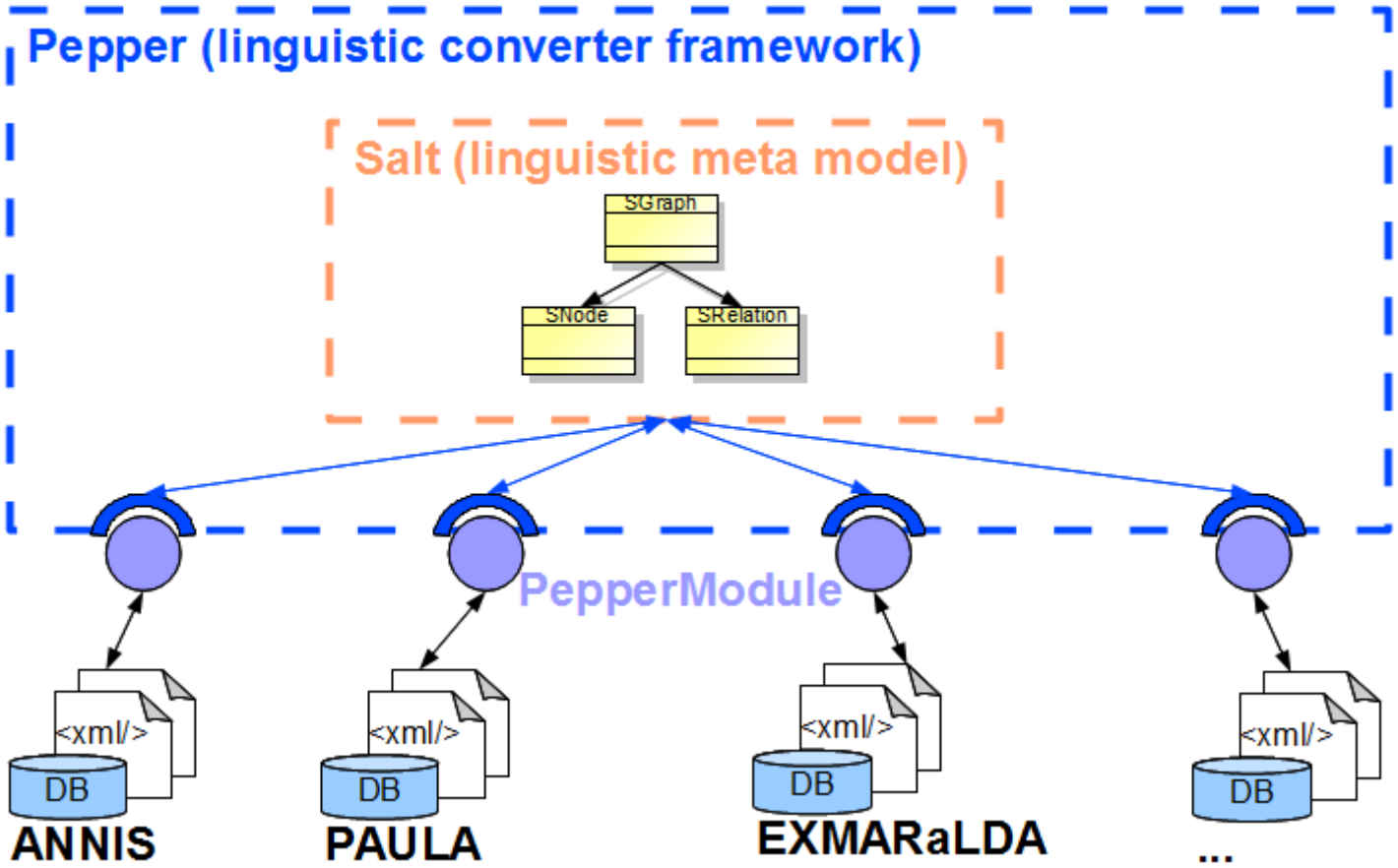
dependencies



information structure

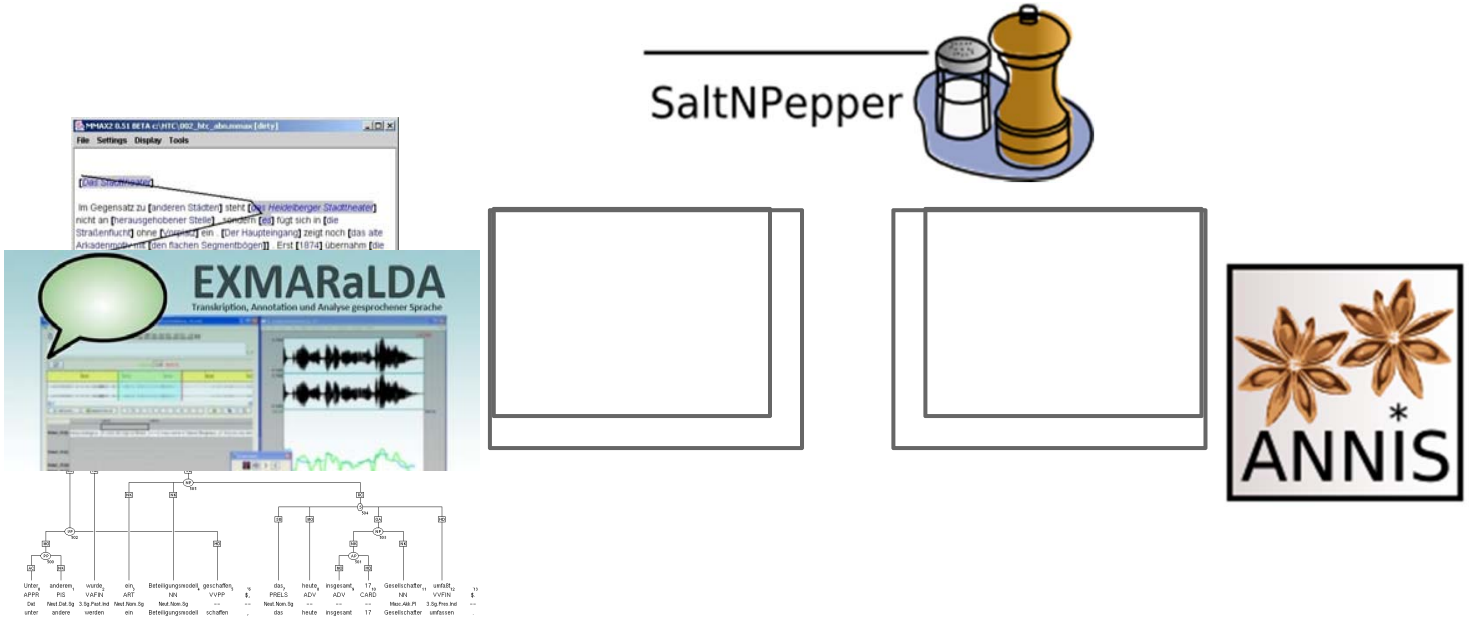
SaltNPepper

http://www.sfb632.uni-potsdam.de/d1-annis.html



SFB 632 – Infrastructure

http://www.sfb632.uni-potsdam.de/d1-annis.html



Summary

- Information structure subsumes
  - Common ground management and content
  - Packaging of information for transfer
  - Cognitive universal categories (orthogonal to each other)
  - Various linguistic means to express these categories
- Cognitive categories are
  - Topic – comment
  - Given – new
  - Focus – background
- Linguistic means to express these categories comprise
  - syntactic, morphological, phonological reflexes or a combination thereof.
  - IS acts on the individual language's grammar.
- Elicitation of IS involves careful methods. Corpus data adds natural occurring data.
  - Proper context allows for IS annotation.
  - Annotation guidelines serve for reliable IS annotation.
  - Simple corpus analysis of IS may result in high variability though.

Sonderforschungsbereich 632

Informationsstruktur:
Die sprachlichen Mittel der Gliederung von Äußerung, Satz und Text

Thank you!

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https://www.sfb632.uni-potsdam.de/aprojekte.html

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Deutsche Forschungsgemeinschaft

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