Canonical Information Structures

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Introduction

- The notion of isomorphism between different representations is being employed more and more to account for unmarked or canonical structures.

  2 examples in this lecture series:

  Selkirk's matching of syntax and prosodic structure.

  Bobaljik & Wurmbrand's PF:LF (incl LF_{IS}) correspondence

- In this talk I show how PF:IS isomorphism is prefered for scopal interpretations and is required for (syntactic) dependencies. Since the PF:IS matching is language specific, the predictions are language specific as well.

Outline

I Information structure
- 1 Topic-Focus
- 2 Subordinate Topic-Focus
- 3 Topic and truth values

II Canonical IS and scope – weak constraint
- 1 English
- 2 Danish

III Canonical IS and Superiority – strong constraint
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IV German – why different?

V Architecture

I Information Structure Primitives: 1 Topic and Focus

Traditional characterizations:

- TOPIC– given, old, what the sentence is about
- FOCUS- answer to wh-question, stressed

  The FOCUS of a sentence S = the (intension of a) constituent c of S which the speaker intends to direct the attention of his/her hearer(s) to, by uttering S.
  (Erteschik-Shir 1973, Erteschik-Shir and Lappin 1979)

  Other types of topic and focus are derived from these 2 primitives→

2 Subordinate f-structure – Deriving Contrast

- ✓ Contrast is contextually constrained to occur only if a contrast set is available.
- ✓ Contrastive elements are stressed.
- ✓ Contrastive elements can be topics as well as foci.

Focus

Which laundry did John wash, the white or the colored:

He washed the WHITE laundry.

Topic

Tell me about your brothers John and Bill: JOHN *is intelligent*…

We employ a kind of book-keeping to keep track of those discourse referents that are ‘given’ and can be topics and we also introduce new potential topics.

How is this done?

Topic-Focus interactions

- Following Reinhart 1981, the common ground is represented by a set of file cards. Each file card represents a discourse referent.
- The cards are organized so that the most recently activated cards are to be found *on top of the stack of cards*. These are the discourse referents which provide potential *topics* in the discourse.
  - How do cards get to be on top of the file?
- This follows implicitly from the definition of the focus. If the attention of the hearer is drawn to (the referent of) X, then the hearer (metaphorically) selects the card for X and puts it in a place of prominence, namely on top of his stack of file cards.
- The card is selected from among the already existing file cards if it is definite and therefore represents an existing referent.
- The hearer is required to make out a new card for an indefinite. This card is again positioned on top of the stack.
  - **The file system involves locating cards on top of a stack (topics) or positioning them there (foci).**

Contrastive file cards

- The contextually available set {John, Bill} represents a 'set' card on the top of the file and is therefore available as a topic (John and Bill). One of the members of the set can however be focused, and thus be selected to be positioned on top of the stack by itself. As a **focus**, it will be stressed and can function as the focus of the sentence. As a member of a topic set, the same constituent will be able to provide a **topic**.

→ contrastive elements can be both topics and foci.

Notation: $\{John_{foc}, Bill\}_{top}$

a contrastive topic:

$[\{John_{foc}, Bill\}_{top}]_{top}$ $[is\ intelligent]_{foc}$ (Bill is not)

Restrictive (d-linked) Topics & Foci

- A contextually specified or 'restrictive' set allows for each of its members to be selected/focused:

  Q: Which one of his friends wants to meet John?
  A: JANET wants to meet John.

✓Restrictive elements are like contrastive ones in that they combine topic properties (they range over a given set) and focus properties (one element or subset of this set is focused). → They function as either topics or foci.

✓Restrictive foci differ from contrastive ones in that the context set need not be as clearly defined and therefore the complement of the selected element is not eliminated. "Janet" is not contrasted with any other particular individual belonging to the set of John's friends.

Subordinate IS

- A variety of different kinds of topic and focus are derived from these two primitives by means of subordinate ISs. These include, in addition to contrastive and restrictive topics and foci also partitive and specific indefinite topics.

- No need for further primitives.

3 Topic and Truth Values

- Following Strawson 1964, Reinhart 1981:
  the topic is the subject of predication =
  the pivot for truth value assessment

→*Every sentence must have a topic.*

- What about all focus sentences?

  Following Gundel 1974, Erteschik-Shir 1997:
  Such sentences have implicit “stage” topics indicating the spatio-temporal parameters of the sentence =
  the here-and-now of the discourse.

By definition the topic has widest scope

3 contexts:

- *Subject Topic*
  Q: Why does John look so pleased with himself?
  A: *He* washed the dishes.

- *Object Topic*
  Q: What happened to the dishes?
  A: John washed *them*.

- *Stage Topic (Out-of-the-blue)*
  Q: What happened?/Why do you look so pleased?
  A: John washed the dishes!

In these cases the calculation of the truth values will come out the same, but that is not always the case→

TOPICS AND SCOPE*

- Since the topic is contextually determined, the scopal relations will also depend on context. Scopal ambiguity is therefore eliminated once a sentence is contextualized.

a	$[Q_1]_{TOP}$ $[V\ Q_2]_{FOC}$	$Q_1 > Q_2$
b	TOP_2 $[Q_1\ V\ Q_2]_{FOC}$	$Q_2 > Q_1$
c	$sTOP_t$ $[Q_1\ V\ Q_2]_{FOC}$	unscoped

An example: ***Two girls invited three boys.***

Outside of context this sentence has 3 different topic choices:

I Subject:

a Ds (Co)	a	---> [1,2,3] *	
	b	---> [4,5,6]	
b Ds (Do)	a	---> 1	b ---> 4
		---> 2	---> 5
		---> 3	---> 6

The subject = topic, the pivot for truth value assessment. The topic includes 2 girls, each has to be examined hence the distributive reading of the topic subject.

The object can be collective as in a. or distributive as in b.

* adapted from Landman 2000.

The example (cont.)

II Object: a Do (Cs) [a,b] ---> 1
[c,d] ---> 2
[e,f] ---> 3

b Do (Ds) a ---> 1 c ---> 2 e ---> 3

b ---> d ---> f --->

The object = topic, the pivot for truth value assessment. The topic includes 3 boys, each has to be examined hence the distributive reading of the topic object.

The subject can be collective as in a. or distributive as in b.

The example (cont.)

III Stage topic: unscoped reading – the sentence is interpreted as predicated of a stage topic, the current here-and-now. This is the reading informants often give when not provided with a context.

An overt topic is also possible:

Today/at 6 o'clock/on the corner, two girls invited three boys.

- exactly 2 boys and 3 girls are involved in the event
- either distributive or collective readings allowed for both.

Partitives and subordinate f(ocus)-structures

- The weakly quantified subjects and objects cannot in fact be interpreted as topics since they are not given or old. To qualify as topics they would have to be interpreted partitively in an appropriate context:

  2 of the girls under discussion

- An example would be a context in which a set of girls is given an assignment to invite as many boys as they can. In this case this discourse specified set of girls would function as the (given) topic and the two girls would be selected from the larger set.

  - How is such a partitive topic derived?

Deriving partitive topics

In this context a set of girls is given → [girls]$_{TOP}$

The selection of 2 girls from this set is performed by focussing on the 2 members of the given set →

[[Two]$_{FOC}$ of [the girls]$_{TOP}$]

- The subordinate f-structure is formed around a discoursally available set which forms the subordinate topic.
- A constituent which defines a subset of this topic set is (subordinately) focused (and consequently stressed) triggering the partitioning of this set.
- The new subset is now available as the main topic.

[[[TWO]$_{FOC}$ [girls]$_{TOP}$]]$_{TOP}$ [invited three boys]$_{FOC}$

Partitive cards

[[Two]$_{FOC}$ of [the girls]$_{TOP}$]

The topic part of this constituent defines a set (the girls)

→a card for this set is situated on top of the stack.

A subset of two members of the set is defined by the focus constituent. Each of these cards stands for a random member of the set of girls:

$girl_j \in \{girls_i\}$

Since the partitive is discourse linked – the set of girls is contextually availabe – the partitive can, but need not, function as the main topic of the sentence.

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II Canonical IS and scope
The unmarked reading(s)

- Of the three readings available for sentences with two quantifiers – the object-topic reading is clearly marked. The subject-topic and stage-topic readings are equally accessible.
- For our examples

2 girls invited 3 boys

the readings in which 2 girls invite up to 6 boys (subject = topic) and the unscoped reading in which exactly 2 girls invite 3 boys, are much easier to get than the reading (object = topic) in which (up to) 6 girls are invited by the 3 boys.

Every man loves some woman

Individual level → no stage topic

a [Every man]$_{TOP}$ [loves some woman]$_{FOC}$

$\forall x, \exists y$ (x loves y)

b TOP$_i$ [every man loves [some woman]$_i$]$_{FOC}$

$\exists x, \forall y$ (x loves y)

The reading in a. is much easier to get than the one in b.→

Again, the reading in which the object is the topic is marked.

1 Canonical IS – English

The unmarked position of topics in English is the subject and the unmarked location of the focus is the VP domain:

Tell me about John:
a He is in love with Mary.
b ??Mary is in love with him.

Also unmarked: What happened?
John is in love with Mary.

- *Canonical* f-structures (English):
  $SUBJECT_{top}$ $[... X ...]_{foc}$
  $sTOP_{t}$ $[…X …]_{foc}$
- Object topics are marked, but not ruled out. Canonical IS is a SOFT constraint on output.

Consequence English

- Readings which require a non-canonical IS are marked
  - Sentences in which the object is the topic are marked.
  - Object wide scope is marked.

2 Danish canonical f-structure

Tell me about John:

a Han elsker Marie.
he loves Mary.

b Ham elsker Marie.
him loves Mary.
Mary loves him

c ??Marie elsker ham_{top}.
Mary loves him.

Canonical f-structure (*Danish*):

X_{top} V [... Y ...]$_{foc}$

Only the linear order of topic and focus with respect to the verb matters.

Danish topicalization

- Danish is like English in that Object topics are marked.
- Danish differs from English in the prevalence of topicalized structures which render canonical ISs for object topics and block topic readings for the non-topicalized elements.

  - ➢ It follows that Danish non-topicalized sentences follow the English pattern, and that in topicalized sentences scope is fixed with the fronted topic necessarily taking wide scope.

Prediction confirmed

Context- The guests are asked to evaluate the dishes served and a report of the evaluation is requested:

a To af gæsterne kunne lide tre af retterne. *Ambiguous*

two of guests-the could like three of the dishes

'Two of the guests liked three of the dishes.'

b Tre af retterne kunne to af gaesterne lide. *Unambiguous*

three of dishes-the could two of guests-the like

- The only reading for b. is one in which there are three particular dishes, that are each liked by 2 guests. (4 guests may be involved)
- a. can also mean that there are 2 particular guests who each like three dishes (6 dishes may be involved)- this is the unmarked reading for a.

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III Superiority

- Identificational Dependencies

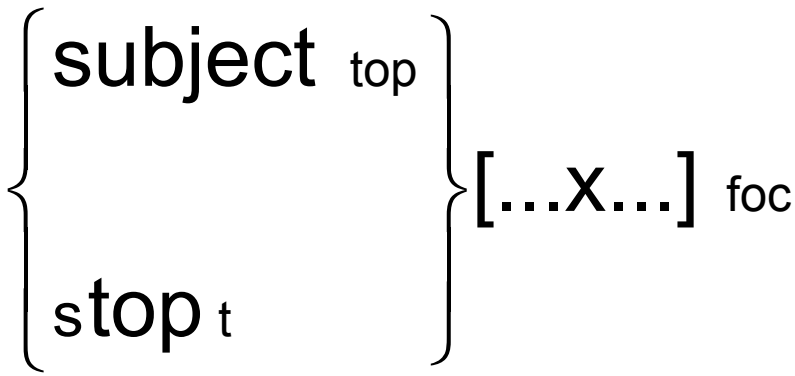
✓ I-Dependencies (e.g., wh-t, multiple wh-, anaphora, NPI-licensing) are restricted to canonical IS. (Erteschik-Shir 1997)

The intuition behind this idea is that the processing load of a marked information structure together with the processing of the dependency leads to processing overload. This not only predicts many well-known constraints on dependencies, it also predicts that these constraints often are context dependent.

➢ It follows that in a configurational language such as English, *isomorphism between PF and IS* = requirement on the processing of dependencies.

Canonical Information Structure (English)

- Dependencies are restricted to canonical IS:



- Canonical IS either aligns subject/topic and predicate/focus or else the sentential focus is predicated of a stage topic, indicating the here-and-now of the discourse.

Wh-Dependencies

- A *wh*-trace is a dependent of the fronted *wh*-phrase.
- In a multiple *wh*- question the wh-phrases form a dependency in that the answer pairs each member of the set of 'who's' to a different object

  Who read what? *John* read *the Times*,
  Peter read *the New Yorker*,
  ….

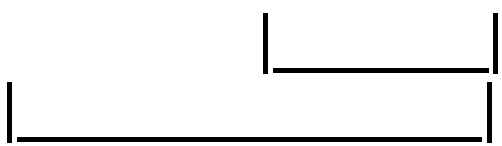
- The proposed constraint restricts such dependencies to a canonical IS. The constraint is thus couched in processing terms in which syntactic structure and IS play a critical role.

1 Superiority (English)

a Who read what?
b *What did who read?
c Which boy read which of the books?
d Which of the books did which boy read?

Superiority effects are the result of two dependencies in the same structure:

*What did who read t



The trace is **doubly identified**.

wh-topics

- Referential *wh*-phrases either range over a context specified set (restrictive) or they "continue the topic-thread" (Sag. et al. 2005).
- They function as topics*, are interpreted contextually and therefore do not need to be reconstructed into trace position
  → no dependency

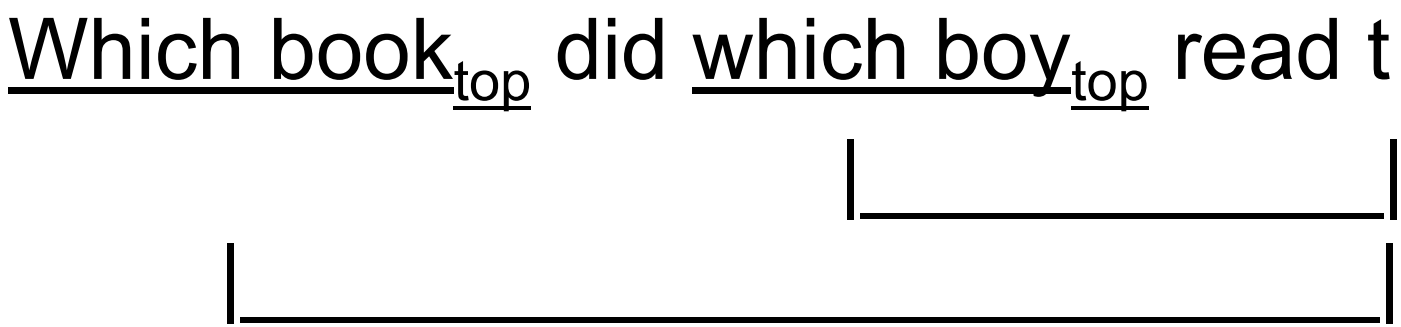
a Which of the books did which boy read?
b I must have missed something. **What did who do to Pierre Salinger?** (Sag et.al. 2005)
c What do they want who to do?
They= the republicans,
who= republicans/democrats.
In the context of Arlin Spector's party change. (on TV)

No problem with double ID
No superiority effect

* Polinsky (2001) about Tsez d-linked wh-phrases

Both wh-phrases = topics

Dependencies are restricted to canonical IS →



The initial wh-phrase is interpreted as a topic, hence no reconstruction necessary

The restriction to canonical IS forces the subject wh-phrase to be interpreted as a topic. →
* Which book did who read?

→topic-adjuncts

a ??When/On which evening did which student see a movie?
b ? Where/At which beach did which tourist swim?
c * How/*In which manner did which cook prepare the food?
d * How/??With which tools did which mechanic fix the car?
e * Why/*For which reasons did which student leave?

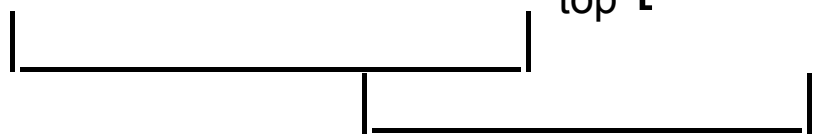
- In a & b the fronted wh-phrase ranges over a set of times or places → function as *stage* topics

Kayne's (1984) facts

Surprisingly, an extra *wh*-phrase improves superiority violations:

(11) What did [who]$_{top}$ [hide t where]$_{foc}$

(12) Who knows what who$_{top}$ [saw t]$_{foc}$



The double-identification of the trace is circumvented by the extra *wh*-phrase.

Another ‘Superiority’ effect

a *What did a boy find?
b What did a certain boy find?
c What did a BOY find?
d What do boys like?

- In b, c and d the subjects are topics → comply with the constraint on dependencies.

2 Superiority in Danish

Remember:

Canonical IS (*Danish*):

$$X_{top} \quad V \quad [... \; Y \; ...]_{foc}$$

Prediction: no superiority effect when the initial wh-phrase is interpreted as a topic→

Prediction confirmed

a Hvem købte hvad?
who bought what

b ?Hvad købte hvem?
what bought who

c *Hvem mødte hvem?
whom met who

Overt d-linking significantly improves the question:

d Hvilken bog købte hvilken pige?
Which book bought which girl?

Superiority in Danish subordinate clauses

- Danish differs from English in that superiority effects in subordinate clauses are not improved by overtly d-linked *wh*-phrases:

a *Jeg ved ikke hvad hvem købte
I know not what who bought

b *Jeg ved ikke hvilken bog hvilken pige købte
I know not which book which girl bought

- Danish marks the topic by fronting it to sentence-initial position. Topicalization *within* a subordinate clause is excluded. It follows that whereas word order may signal the IS of the main clause, the order within subordinate clauses does not.

Superiority – Sum

- A referential fronted *wh*-phrase in multiple *wh*-questions is required in order to avoid double ID. That is why such questions are always sensitive to context.

- Variation among languages follows from the canonical IS of the language.

- This IS-PF isomorphism enables the processing of the dependency.

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IV German -- Superiority

Canonical IS very similar to Danish- topic precedes focus
→ the initial wh-phrase must be interpreted as a topic

- According to Fanselow 2004*, OSV order is licensed only if the object is discourse linked

wir haben bereits herausgefunden
we have already found out
a wer jemanden gestern anrief, und wer nicht
who.nom someone.acc yesterday called and who.nom not
b wen jemand gestern anrief, und wen nicht
who.acc someone.nom yesterday called and who.acc not
Aber wir sind nicht eher zufrieden, bis wir auch wissen
But we are not earlier content until we also know
a' wer WEN angerufen hat
who.nom who.acc called has
b' wen WER angerufen hat

*See also Featherston 2005, Wiltschko 1998

German Scope

- If topic precedes the focus, then, according to the canonical IS of German, linear order should determine scope.

- This is indeed generally the case in languages with free word order such as German and Japanese.

BUT: Krifka 1998 – inverse scope is possible with ‘rise-fall’ intonation →

German examples from Krifka

a Jeder Student hat mindestens einen Roman gelesen
every.NOM boy has at.least one.ACC novel read

b /JEDer Student hat mindestens \EINen Roman gelesen.

- a. only subject wide scope because initial subject = topic
- The Rise-fall intonation in b. triggers ambiguity. Both subject and object are contrastive or restrictive (indicated by the intonation and context).
- Such elements can be interpreted as either topic or focus, allowing for both scopal interpretations.
- Object wide scope in b renders a non-canonical IS where foc<top.

See Krifka 1998 and references cited for similar observations but different analyses.

Unexpected: German topicalization results in ambiguity

a *Mindestens einen Roman* HAT jeder Student t_{OBJ} gelesen
at.least one novel has every student read

b *Jeden Roman* HAT mindestens ein Student t_{OBJ} gelesen

both ∃>∀ and ∀>∃

- Danish was correctly predicted to have rigid scope in such a case with the topicalized element taking wide scope.
- German seemingly allows for both arguments to be interpreted as topics in this case. Note the verum stress on the auxiliary.

Bobaljik and Wurmbrand predictions

1. Inverse scope is barred in German because a 'competing' construction is available (topicalization/scrambling) in which PF and LF orders match.*

2. Topicalization not available in English, therefore inverse scope is licensed.

3. Danish is a problem for B&W. Topicalization is available yet so is inverse scope in (non-contrastive) non-topicalized Ss.

*Wurmbrand 2008 offers an explanation for the ambiguity resulting from topicalization.

Danish vs. German

- German has overt case marking allowing for the marking of IS by word order without relinquishing the identification of syntactic roles.

- The lack of overt case marking in Danish full DPs causes potential ambiguity in DP V DP strings. In such cases only the Subj V Obj interpretation is licensed → object wide scope in situ is the only option.

Remaining question

- Why does topicalization/scrambling allow for ambiguity in German but not in Danish?

- Overt case marking can't be the answer since Russian = Danish (Ionin 2001)

- Topicalization and V-2 exists in both languages, but topicalization may have different IS properties in the two languages.
  → Research along the lines of McNay 2005 comparing the properties of topicalization as well as actual scopal interpretations.

Canonical IS - SUM

- Why do canonical ISs differ cross-linguistically?

Should follow from other differences –

- basic word order?
- language specific morpho-phonological properties?

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Architecture I – top/foc features

- The information structure primitives, top and foc play a central role in grammar, yet it is difficult to make their properties conform to those of other linguistic categories.

- Subordinate f-structures not possible in Rizzi (1997) type projections of topic and focus phrases.

- 2 other options to introduce top/foc features – notational variants:

  - annotations on syntactic output

  - introducing top,foc features as an optional part of lexical selection. On a par with φ-features, they may percolate to the maximal projection of the lexical item they are assigned to. (Avoids violation of Inclusiveness.) (Erteschik-Shir 2006)

Architecture II

- Focus structure predicts phonological properties (among them intonation) as well as interpretative properties (among them quantifier scope).

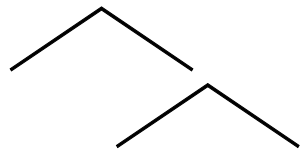
- The processing constraint on syntactic dependencies, requires both IS and syntactic structure to be visible at the interface.

- IS is marked by word order, intonation and/or morphology. Suggests that at least part of word order is determined post-syntactically as part of the phonological computation.

- Allows for a more minimalistic syntax (without LF).

Architecture III

Initial merge (incl. top/foc)



→θ-assignments

➔ Interpret

↓

PF computation

→ dislocation
→ morphology
→ phonology

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