Intonational and Semantic Aspects of Information Structure

Stefan Baumann $\langle baumann@coli.uni-sb.de \rangle$
Geert-Jan Kruijff $\langle gj@coli.uni-sb.de \rangle$
Ivana Kruijff-Korbayová $\langle korbay@coli.uni-sb.de \rangle$

http://www.coli.uni-sb.de/ korbay/Lehre/IS-beschreibung.html

Introduction

This Lecture Plan:

- Practical introduction
- Outline of the seminar
- Introduction to Information Structure

Basic reading: (Steedman 2000a)

Illustration

(1) Sign in London underground:
Dogs must be carried.

This can be read in two different ways (where capitals denote intonation center):

(1) a. Dogs must be CARRIED.
b. DOGS must be carried.

There is a difference in meaning:

(1′) a. If you have a dog, you must carry it.
b. What you must do is carry a dog.

Different languages realize the different meanings differently.

Different Realizations of IS

(2) in Czech:

a. Psi se musí NÉST.
Dogs$_{nom}$ refl must$_{3sg}$ carry$_{inf}$

b. Musí se nést PSI.
Must$_{3sg}$ refl carry$_{inf}$ dogs$_{nom}$

Different Realizations of IS

(3) in German and Dutch:

a. Hunde mußen GETRAGT werden.
b. Es mußen HUNDE getragt werden.
a. Honden moeten GEDRAGEN worden.
b. Er moeten HONDEN gedragen worden.

or also (and similarly in Greek):

a. Hunde muß man TRAGEN.
b. Man muß HUNDE tragen.
a. Men moet honden DRAGEN.
b. Men moet HONDEN dragen.

Different Realizations of IS

(4) in Hungarian:

a. Kutyákat VINNI kell.
Dogs$_{acc}$ carry$_{inf}$ must.
b. KUTYÁKAT kell VINNI
Dogs$_{acc}$ must carry$_{inf}$

(5) in Chinese:

a. Gou a, yao QIAN zhe zhou.
Dogs TOPIC must carry ASP go.
b. GOU yao qian zhe zhou.
dogs must carry ASP go

Different Realizations of IS

(6) in Japanese:

a. Inu-wa KAKAEtekudasai.
dog$_{top}$ carry.please
Please CARRY dogs.
b. INU-O kakaetekudasai.
dog$_{acc}$ carry.please
Please carry DOGS (not something else).

Slightly more formal forms:

a. Inu-wa KAKAEnakrebaikemasen.
dog$_{top}$ carry.must.
b. INU-O kakaenakerebaikemasen.
dog$_{acc}$ carry.must

(7) Japanese (cont'd): Ambiguous between (a) and (b):

INU-wa KAKAEarerubrkida.
dog$_{cont}$r carry.pass.must

What is Information Structure?

- Speakers organize their utterances in a way that reflects their communicative intentions (the intended context change), and their model of the context
- Utterances both *reflect* and *affect* the context.
- Intuitively, IS is a means a speaker employs to present some parts of the meaning as *context-dependent*, and others as *contect-affecting*. Thus, IS concerns a division into:
  - the part which relates it to the purpose of the discourse and anchors the content to the context (i.e., what speaker and hearer are attending to)
  - the part which advances the discourse, ie. adds or modifies some information
- IS is an inherent aspect of meaning —it is an important factor in establishing coherence with respect to the context in which a sentence is uttered.

Topics covered in the "Lectures" of the Seminar

- Basic concepts of IS realization, representation and interpretation (IKK)
- IS Realization means within and across languages (GJMK)
- Different approaches to IS (IKK)
- IS and Discourse Context (IKK)
- IS and Intonation (SB)
- IS and word order (GJMK)
- Realization and interpretation of IS in German (SB+GJMK)

Basic Concepts

Basic Concepts of IS

IS-partitioning:

- Context-dependent vs. context-affecting part of sentence meaning
- Two dimensions of IS within a sentence:

  Theme$_{is}$-Rheme$_{is}$ partitioning reflects an *aboutness* relation, i.e., the Rheme is semantically predicated over the Theme$_{is}$

  Background-Foreground partitioning within each Theme$_{is}$ and Rheme$_{is}$ reflects an abstract notion of contrast between alternatives available in the discourse context, against which the actual utterance (its Theme$_{is}$ and its Rheme$_{is}$) are cast

  (terminology mirrors that used in (Steedman 2000b; Steedman 2000a), with two slight modifications)

IS Partitioning: Examples

(8) Q. I know how to transport babies in the metro. But what about DOGS?

$$\text{A.}\quad \underbrace{\underbrace{\overset{\text{Dogs}}{\text{L+H*LH\%}}}_{Foreground}}_{Theme_{is}}\ \underbrace{\underbrace{\text{must be}}_{Background}\ \underbrace{\overset{\text{CARRIED}}{\text{H*LL\%}}}_{Foreground}}_{Rheme_{is}}$$

The dogs, as opposed to other loads, must be carried, as opposed to other ways of transporting.

IS Partitioning: Examples

(9) Q. What must we do in order take the metro?

$$\text{A.}\quad \underbrace{\underbrace{\overset{\text{Dogs}}{\text{H*}}}_{Foreground}\ \underbrace{\overset{\text{must be carried.}}{\text{LL\%}}}_{Background}}_{Rheme_{is}}$$

In order to take the metro one has to carry a dog, as opposed to doing other things.

IS Partitioning: Examples

from (Steedman 2000a)

(10) Q. I know that Marcel likes the man who wrote the musical.
But who does he ADMIRE?

$$\text{A.}\quad \underbrace{\underbrace{\text{Marcel}}_{Background}\ \underbrace{\overset{\text{ADMIRES}}{\text{L+H*LH\%}}}_{Foreground}}_{Theme_{is}}\ \underbrace{\underbrace{\text{the woman who}}_{Background}\ \underbrace{\overset{\text{DIRECTED}}{\text{H*}}}_{Foreground}\ \underbrace{\overset{\text{the musical}}{\text{LL\%}}}_{Background}}_{Rheme_{is}}$$

- the $Theme_{is}$-Foreground distinguishes this $Theme_{is}$ from another $Theme_{is}$
- the Background/Foreground of this $Rheme_{is}$ is supported just in case all individuals considered have something to do with the musical, and the property of directing it uniquely identifies one such individual

Question test

(Sgall, Hajičová, and Panevová 1986)

Question-answer pairs are commonly used to indicate in which context a particular IS is appropriate: the question sets the $Theme_{is}$, and asks for the $Rheme_{is}$.

(11) Q. What does John WRITE? A. $\underbrace{\text{John writes}}_{Theme_{is}}\ \underbrace{\text{NOVELS}}_{Rheme_{is}}$.

(12) Q. Who writes NOVELS? A. $\underbrace{\text{John}}_{Rheme_{is}}\ \underbrace{\text{writes novels}}_{Theme_{is}}$.

Mismatches between Q and A can be used to test IS: e.g., when (11.Q) and(12.Q) are exchanged, we get incoherent Q-A pairs.

Do not confuse with Q-A pairs in a natural dialogue!

Question test

(13) John flew from London to PARIS.

(14) John flew to Paris from LONDON.

(15) a. What happened?
b. What did John do?
c. Where did John fly?
d. To which place did John fly from London?
e. From which place did John fly to Paris?
f. Who flew from London to Paris?

(13) is good as an answer to (15a-d);
(14) only matching answer to (15e).
Neither(13) nor (14) is a good answer to (15f).

Representation of IS

Essentially, what we need is an *IS-partitioned representation* of the linguistic meaning of a sentence. This can be

- IS-partitioned logical form (Rooth 1992; Steedman 2000a)
- structured meaning representation (von Stechow 1991; Krifka 1993)
- IS-partitioned Discourse Representation Structure (Kruijff-Korbayová 1998)

For example, Steedman (Steedman 2000a) uses:

- θ-operator for Theme$_{is}$
- ρ-operator for Rheme$_{is}$
- $*$ indicates elements of Foreground within each Theme$_{is}$ and Rheme$_{is}$

IS-partitioned LF: Example

(8′) Q. I know how to transport babies in the metro. But what about DOGS?

A.
$$\underbrace{\underbrace{\overset{\text{DOGS}}{\text{L+H*LH\%}}}_{Foreground}}_{Theme_{is}}\ \underbrace{\underbrace{\text{must be}}_{Background}\ \underbrace{\overset{\text{CARRIED}}{\text{H*LL\%}}}_{Foreground}}_{Rheme_{is}}$$

θ(8): $\lambda Q.\ Q\ (\star dog')$
ρ(8): $\lambda x. \star carry'(hearer', x)$

IS-partitioned LF (8):
$\theta(\lambda Q.\ Q\ (\star dog'))\ \rho(\lambda x. \star carry'(hearer', x))$

IS Interpretation

- Steedman (Steedman 2000a) defines the semantics of IS in terms of selecting one member from a *presupposed set of alternatives*
  - Theme$_{is}$ presupposes a *Rheme$_{is}$-alternative set*, i.e., a set of alternative propositions that could possibly answer the corresponding question in the given context; Rheme$_{is}$ than restricts the Rheme$_{is}$-alternative set to a singleton
  - Theme$_{is}$ also presupposes a *Theme$_{is}$-alternative set*, i.e. a set of alternative questions; Foreground within Theme$_{is}$ then restricts the Theme$_{is}$-alternative set to a singleton
- These are pragmatic presuppositions that the relevant alternative set is available in the context.

IS Interpretation: Example

(8′) Q. I know how to transport babies in the metro. But what about DOGS?

A.

$$\underbrace{\underbrace{\overset{\textsc{Dogs}}{\text{L+H*LH\%}}}_{Foreground}}_{Theme_{is}}\ \underbrace{\underbrace{\text{must be}}_{Background}\ \underbrace{\overset{\textsc{carried}}{\text{H*LL\%}}}_{Foreground}}_{Rheme_{is}}$$

θ(8): $\lambda Q.\ Q\ (\star dog')$

ρ(8): $\lambda x. \star carry'(hearer', x)$

ρ-AS(8): $\{carry'(hearer', dog'),$
$walk\_on\_lead(hearer', dog'), load\_on\_buggy(hearer', dog')\}$

θ-AS(8): $\{\exists Q.Q(dog'), \exists P.P(baby')\}$

IS-sensitive Context Updating

- Krifka (1992), Kruijff-Korbayová (1998), Steedman (2000)
- Updating with an IS-partitioned proposition ψ proceeds in two phases:

  Theme$_{is}$ update phase : $c_1[\theta(\psi)]c_2$
  Rheme$_{is}$ update phase : $c_2[\rho(\psi)]c_3$

  $$c_1 \xrightarrow{\theta(\psi)} c_2 \xrightarrow{\rho(\psi)} c_3$$

- $\theta(\psi)$ update: verify Theme$_{is}$ presuppositions AS$_\theta(\psi)$ and AS$_\rho(\psi)$, restrict AS$_\theta(\psi)$
- $\rho(\psi)$ update: restrict AS$_\rho(\psi)$

Intermezzo

"Focussing jokes"

(16) Why do firemen wear RED suspenders?
To keep their PANTS up.

(17) Why do we dress GIRLS IN PINK and BOYS IN BLUE?
Because they can't dress THEMSELVES.

(18) Why do we buy CLOTHES?
Because we can't get them for FREE.

(19) Why do you rob BANKS?
Because THAT'S where the MONEY is!

"Focussing jokes"

Explanation for (16-18): The question's IS-partitioning induces a presupposition; the answer should provide the missing information asked for, i.e.:

(16) a reason for the red color
(17) a reason for the choice of (different) colors
(18) a reason to buy clothing

But, the given answers answer different questions in terms of IS, and therefore, a mismatch arises, which is what makes it funny. The answered questions are:

(16′) Why do firemen wear red SUSPENDERS? (reason for suspenders)
(17′) Why do WE dress girls in pink and boys in blue? (reason for us doing the dressing up)
(18′) Why do we BUY clothes? (reason for buying)

"Focussing jokes"

Explanation for (19): The question's IS-partitioning allows two interpretations:

- "broad focus" reading, where *you rob banks* is included in Rheme$_{is}$
- "narrow focus" reading, where only *banks* is included in Rheme$_i$s, while the fact that the hearer robs something is presupposed

While without any particular context, the broad focus reading is the default, the answer answers the narrow focus reading of the question, and that's what creates the surprise effect, and therefore makes it funny..

References

Krifka, M. (1993). Focus and presupposition in dynamic semantics. *Theoretical Linguistics 19*, 269–300.

Kruijff-Korbayová, I. (1998). *The Dynamic Potential of Topic and Focus: A Praguian Discourse Representation Theory*. unpublished Ph.D. thesis, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic.

Rooth, M. (1992). A theory of focus interpretation. *Natural Language Semantics 1*, 75–116.

Sgall, P., E. Hajičová, and J. Panevová (1986). *The meaning of the sentence in its semantic and pragmatic aspects*. Dordrecht, The Netherlands: Reidel.

Steedman, M. (2000a). Information structure and the syntax-phonology interface. *Linguistic Inquiry 31*(4), 649–689.

Steedman, M. (2000b). *The Syntactic Process*. Cambridge, MA: M.I.T. Press.

von Stechow, A. (1991). Focusing and backgrounding operators. In W. Abraham (Ed.), *Discourse Particles: Descriptive and Theoretical Investigations on the Logical, Syntactic and Pragmatic Properties of Discourse Particles in German*, pp. 37–84. Amsterdam: John Benjamins.