Information Structure
Overview and Comparison of Theories

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MPI Nijmegen, 5 – 19 November 2007

Roadmap

Lect 1 IS: an inherent aspect of utterance meaning
Lect 2 IS realization means
Lect 3 The Praguian Topic-Focus Articulation
Lect 4 Familiarity status and salience, various models of common ground.
Lect 5 Halliday's Thematic- vs. Information-Structure.
Lect 6 Vallduví's Information Packaging. File-Change Semantics of IS.
Lect 7 Steedman's two dimensions of IS. Alternative-set semantics of IS.
Lect 8 Aligning IS approaches. Practical evaluation. Corpus annotation.

Lecture 1

IS: An Inherent Aspect of Meaning

Outline

- Motivation

- Information structure partitioning

- Question test for IS

- Two dimensions of IS partitioning

- Meaning differences due to IS

Motivation

Illustration

(1) Sign in London underground: *Dogs must be carried.*   (Halliday, 1970)

    a. Dogs must be CARRIED.

       Interpretation: *If you have a dog, you must carry it.*

    b. DOGS must be carried.

       Interpretation: *You must carry a dog.*

But:

(2) Sign in a synagogue: *Hats must be worn.*

    a. Hats must be WORN.

       Interpretation: *If you have a hat, you must wear it.*

    b. HATS must be worn.

       Interpretation: *You must wear a hat.*

(Capitals denote main intonation center = nuclear stress in the sentence.)

Illustration

(3) a. U: What is the status of the stove?

       S: The stove is switched ON.

    b. U: Which device is switched on?

       S: The STOVE is switched on.

(4) a. U: When does Jane have swimming on Tuesday?

       S: Jane has swimming AT NOON on Tuesday.

       S': On Tuesday, Jane has swimming AT NOON.

    b. U: What does Jane have at noon on Tuesday?

       S: Jane has SWIMMING at noon on Tuesday.

       S': At noon on Tuesday, Jane has SWIMMING.

Various aspects of surface form are involved!

Illustration

(5) Czech:

    a. *Psi   se   musí   NÉST.*

       Dogs_{nom} refl must_{3pl} carry_{inf}

    b. *Musí   se   nést   PES.*

       Must_{3sg} refl carry_{inf} dog_{nom}

(6) German:

    a. *Hunde mussen GETRAGEN werden.*

       Dogs   must   carried   be

    b. *Es   mussen HUNDE getragen   werden.*

       It_{explet} must_{3pl} dogs_{nom} carried_{part} be_{inf}.

Different languages may realize the same meaning differences differently!

Observations

- Surface form of utterances reflects their communicative goal w.r.t. the context

  – Variation of surface form aspects, such as intonation, word order and syntactic structure is not arbitrary

  – Not just **what is said** but also **how** is important (cf. Grice's Maxim of Manner (Grice, 1975))

- Various aspects of surface form interact

- Different languages may use different combinations of surface form aspects to realize the same variation

⇒ **Information Structure** as a unifying abstract notion at the level of utterance meaning

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Information Structure Partitioning

Information Structure

- IS comprises *utterance-internal structural and semantic properties reflecting its relation to the discourse context*, in terms of the discourse status of its contents, the actual and attributed attentional states of the discourse participants, and the participants' prior and changing attitudes (knowledge, beliefs, intentions, expectations, etc.)   (Kruijff-Korbayová and Steedman, 2003)

- 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.

- IS is represented as a partitioning of utterance meaning w.r.t. how parts of an utterance *depend on* and *affect* the context

- IS is reflected in/by the surface realization of the utterance

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Information Structure: Theme/Rheme Partitioning

- **Theme** 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); what the utterance is *about*, the *topic* that the speaker means to address; may also *restrict* the context to particular type(s) of situation(s)

- **Rheme** the part which advances the discourse, i.e., adds or modifies some information (i.e., the informative part); what the speaker says about the Theme, i.e., the Rheme is semantically predicated over the Theme

Theme-Rheme Partitioning: Examples

(7) a. $\underbrace{\text{Dogs}}_{\textit{Theme}}$ $\underbrace{\text{must be CARRIED.}}_{\textit{Rheme}}$

b. $\underbrace{\text{DOGS must be carried.}}_{\textit{Rheme}}$

c. $\underbrace{\text{DOGS}}_{\textit{Rheme}}$ $\underbrace{\text{must be carried.}}_{\textit{Theme}}$

d. $\underbrace{\text{Dogs}}_{\textit{Theme}}$ $\underbrace{\text{MUST be}}_{\textit{Rheme}}$ $\underbrace{\text{carried.}}_{\textit{Theme}}$

Theme-Rheme Partitioning: Examples

(8) a. U: What is the status of the stove?
    $\underbrace{\text{The stove}}_{\textit{Theme}}$ $\underbrace{\text{is switched ON.}}_{\textit{Rheme}}$

b. U: Which device is switched on?
    S: $\underbrace{\text{The STOVE}}_{\textit{Rheme}}$ $\underbrace{\text{is switched on.}}_{\textit{Theme}}$

Question test for IS

Question Test for IS

Question-answer pairs are commonly used to indicate or (operationally) test the context in which a particular IS is appropriate: the question determines the Theme; what is asked for is the Rheme; the answer "fills" the Rheme. (Sgall et al., 1986; Steedman, 2000a; Kruijff-Korbayová and Steedman, 2003)

(9) Q. What does John do? A. $\underbrace{\text{John}}_{\textit{Theme}}$ $\underbrace{\text{writes NOVELS}}_{\textit{Rheme}}$.

(10) Q. Who writes NOVELS? A. $\underbrace{\text{JOHN}}_{\textit{Rheme}}$ $\underbrace{\text{writes novels}}_{\textit{Theme}}$.

Swapping the questions in the two examples results in incoherent Q-A pairs: the answers become infelicitous, because the IS partitioning then does not match the context set by the question.

Question Test for IS: "Focus Projection"

The linguistic form of an utterance may be compatible with several different IS partitionings (as reflected by different questions)

(11)   John writes NOVELS.

    a. What does John write?

       $\underbrace{\text{John writes}}_{Theme}$ $\underbrace{\text{NOVELS.}}_{Rheme}$ "narrow focus"

    b. What does John do?

       $\underbrace{\text{John}}_{Theme}$ $\underbrace{\text{writes NOVELS.}}_{Rheme}$ "broad focus"

    c. What is going on? / What is the news?

       $\underbrace{\text{John writes NOVELS.}}_{Rheme}$ "broad focus"

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(12)   John writes NOVELS.

    # Who writes novels?

    # What does John do with/about novels?

(13)   Who writes novels?

    $\underbrace{\text{JOHN}}_{Rheme}$ $\underbrace{\text{writes novels.}}_{Theme}$ "narrow focus"

(14)   What does John do with novels?

    $\underbrace{\text{John}}_{Theme}$ $\underbrace{\text{WRITES}}_{Rheme}$ $\underbrace{\text{novels.}}_{Theme}$ "narrow focus"

Question Test for IS: "Focus Projection"

(15)   John flew from London to PARIS.

(16)   a. What happened?

    b. What did John do?

    c. Where did John fly?

    d. To which place did John fly from London?

(15) is good as an answer to (16a-d). It has several possible IS partitionings.

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(17) is only a matching answer to (18).

(17)   John flew to PARIS from London.

(18)   Where did John fly from London?

(19) is only a matching answer to (20).

(19)   John flew from LONDON to Paris.

(20)   From which place did John fly to Paris?

Neither of the above is a good answer to (21).

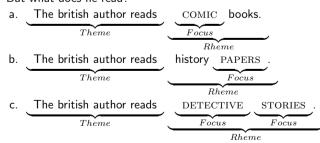(21)   Who flew from London to Paris?

(22)   JOHN flew from London to Paris.

Two Dimensions of IS Partitioning

Two Dimensions of IS Partitioning

IS concerns two aspects of a division (partitioning) of an utterance meaning (Kruijff-Korbayová and Steedman, 2003):

- **Theme-Rheme** partitioning reflects the dichotomy between what an utterance is about (how its message is anchored to the context) and how it advances the discourse

- **Background-Focus** partitioning reflects an abstract notion of contrast between alternatives available in the discourse context, against which the actual utterance is cast;
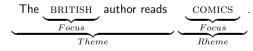
  (Steedman, 2000a): B/F partitioning within Theme and/or Rheme reflects alternative Theme(s) and/or Rheme(s) in the context.

IS Partitioning: Background-Focus in Rheme

(23) I know the british author writes history books.
      But what does he read?

  a. The british author reads [*Theme*] COMIC [*Focus*] books. [*Rheme*]

  b. The british author reads [*Theme*] history PAPERS [*Focus*] . [*Rheme*]

  c. The british author reads [*Theme*] DETECTIVE [*Focus*] STORIES [*Focus*] . [*Rheme*]

IS Partitioning: Background-Focus in Theme

(24) I know the american author reads history books.
      But what does the british author read?

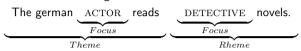 The BRITISH [*Focus*] author reads [*Theme*] COMICS [*Focus*] . [*Rheme*]

(25) I know the american author reads history books.
      But what does the american actor read?

  The american ACTOR [*Focus*] reads [*Theme*] COMICS [*Focus*] . [*Rheme*]

IS Partitioning:
Background-Focus in Theme and Rheme

(26) I know the german author reads history novels.
But what does the german actor read?

The german $\underbrace{\underbrace{\text{ACTOR}}_{Focus}\text{ reads}}_{Theme}$ $\underbrace{\underbrace{\text{DETECTIVE}}_{Focus}\text{ novels.}}_{Rheme}$

(27) I know the british author writes history books.
But what does he read?

The british author $\underbrace{\underbrace{\text{READS}}_{Focus}}_{Theme}$ $\underbrace{\underbrace{\text{COMIC}}_{Focus}\text{ books.}}_{Rheme}$

Meaning Differences

IS: Meaning Differences

(28) Dogs must be carried.   (Halliday, 1970)

a. What about dogs? $\underbrace{\text{Dogs}}_{Theme}$ $\underbrace{\text{must be CARRIED.}}_{Rheme}$

i.e., If there is a dog, it must be carried.
Alternatives: $\{\exists P.(P(e) \wedge patient(e, dog))\}$

b. $\underbrace{\text{DOGS must be carried.}}_{Rheme}$
Alternatives: $\{\exists P.P(e)\}$

IS: Meaning Differences

(29) Smoke in the hallway.   (Hajičová, 1993)

a. Where should one smoke? $\underbrace{\text{Smoke}}_{Theme}$ $\underbrace{\text{in the HALLWAY.}}_{Rheme}$

i.e., If you (want to) smoke, do it in the hallway.
Alternatives: $\{\exists x.(smoke(e) \wedge location(e, x))\}$

b. What should one do in the hallway? $\underbrace{\text{SMOKE}}_{Rheme}$ $\underbrace{\text{in the hallway.}}_{Theme}$

i.e., If you are in the hallway, smoke.
Alternatives: $\{\exists P.(P(e) \wedge location(e, hallway))\}$

IS: Meaning Differences

(30) Staff behind counter.   (Hajičová, 1993)

  a. Where should staff be? $\underbrace{\text{Staff}}_{Theme}$ $\underbrace{\textsc{behind counter.}}_{Rheme}$

  i.e. Where staff should be is (only) behind the counter.
  Alternatives: $\{\exists x.location(staff, x)\}$

  b. Who should be behind the counter? $\underbrace{\textsc{Staff}}_{Rheme}$ $\underbrace{\text{behind counter.}}_{Theme}$

  i.e., Who should be behind the counter is (only) staff.
  Alternatives: $\{\exists y.location(y, behind\_counter)\}$

IS: Meaning Differences

(31) One speaks English on the Shetlands.

  a. Where is English (mostly) spoken?
  $\underbrace{\text{One speaks English}}_{Theme}$ $\underbrace{\text{on the \textsc{Shetlands}.}}_{Rheme}$
  Alternatives:
  $\{\exists y.(speak(e) \wedge language(e, english) \wedge location(e, y))\}$

  b. What language is (mostly) spoken on the Shetlands?
  $\underbrace{\text{One speaks \textsc{English}}}_{Rheme}$ $\underbrace{\text{on the Shetlands.}}_{Theme}$
  $\underbrace{\text{On the Shetlands one speaks}}_{Theme}$ $\underbrace{\textsc{English.}}_{Rheme}$
  Alternatives:
  $\{\exists x.(speak(e) \wedge location(e, shetlands) \wedge language(e, x))\}$

IS: Meaning Differences

(32) Officers always escorted ballerinas.   (Partee et al., 1998)

  a. Whom did officers always escort?
  $\underbrace{\text{Officers escorted}}_{Theme}$ always $\underbrace{\textsc{ballerinas.}}_{Rheme}$
  Alts: $\{\exists x.(escort(e) \wedge actor(e, officer) \wedge patient(e, x))\}$

  b. What did officers always do?
  $\underbrace{\text{Officers}}_{Theme}$ always $\underbrace{\text{escorted \textsc{ballerinas}.}}_{Rheme}$
  Alts: $\{\exists P.(P(e) \wedge actor(e, officer))\}$

  c. Who always escorted ballerinas?
  $\underbrace{\textsc{Officers}}_{Rheme}$ always $\underbrace{\text{escorted ballerinas.}}_{Theme}$
  Alts: $\{\exists y.(escort(e) \wedge actor(e, y) \wedge patient(e, ballerina))\}$

IS: Meaning Differences

Czech newspaper 1990:   (Hajičová)

(33) Dobrá zpráva je, že Češi udělali revoluci.
  Špatná zpráva je, že revoluci udělali Češi.
  The good news is that the Czechs made a revolution;
  the bad news is that a revolution was made by the Czechs.
  (. . . the bad news is that the Czechs made a revolution.)

  Alternatives:
  $\{\exists P.(P(e) \wedge actor(e, czechs))\}$
  $\{\exists x.(revolt(e) \wedge actor(e, x))\}$

Czech newspaper: (Hajičová)

(34) Problém není v tom, že Janouch koupil gamma nůž,
ale že gamma nůž koupil Janouch.

The problem is not that Janouch bought a gamma-knife,
but that the gamma-knife was bought by Janouch.
(. . . but that JANOUCH bought the gamma knife.)

Alternatives:
$\{\exists x.(buy(e) \land actor(e, janouch) \land patient(e, x))\}$
$\{\exists y.(buy(e) \land actor(e, y) \land patient(e, gknife))\}$

Intermezzo

"Focussing jokes"

(35) Why do firemen wear red suspenders?
To keep their pants up.

(36) Why do we buy clothes?
Because we can't get them for free.

(37) Why do we dress girls in pink and boys in blue?
Because they can't dress themselves.

(38) Why do you rob banks?
Because that's where the money is!