Information structure

Information structure is the level of sentence organisation which represents how the speaker structures the utterance in context in order to facilitate information exchange. Specifically, it indicates how the propositional content of an utterance fits the addressee’s state of knowledge at the time of utterance. (Dalrymple & Nikolaeva, 2011, Chapter 3)

Content of information structure

- **TOPIC**: the entity or entities that the proposition is about (Reinhart, 1981; Gundel, 1988; Lambrecht, 1994). An entity, E, is the topic of a sentence, S, iff in using S the speaker intends to increase the addressee’s knowledge about, request information about, or otherwise get the addressee to act with respect to E (Gundel, 1988). There can be more than one topic, the primary topic and the secondary topic (Nikolaeva, 2001; Dalrymple & Nikolaeva, 2011).

- **FOCUS**: informative, newsy, contrary-to-expectation part of the sentence (Vallduví, 1992; Vallduví & Engdahl, 1996); the semantic component of a pragmatically structured proposition whereby the assertion differs from the presupposition (Lambrecht, 1994)

Content of information structure

- **BACKGROUND**: old/presupposed information specifying detailed knowledge that may be necessary for a complete understanding of new (focused) information — different from TOPIC, which is a pointer to the relevant information to be accessed by the addressee (Butt & King, 2000)

- **COMPLETIVE**: new to the addressee but, unlike focus, not associated with the difference between pragmatic assertion and pragmatic presupposition (Butt & King, 2000)

What is Bill eating?

He is eating pizza in the kitchen.

**TOPIC** **BACKGROUND** **FOCUS** **COMPLETIVE**

Information structure in LFG

Mycock (2009): the traditional semantic structure of LFG, an important component of the “glue” approach to the syntax-semantics interface, plays an important role in representing information structure relations.
Categorising meaning contributions

Categorise meaning constructors according to their information structure role (similar to “structured meaning” approaches: von Stechow 1982; Krifka 1992).

[What did John do?] John married Rosa.

\[ m : \begin{bmatrix}
\text{TOPIC} & \text{FOCUS} \\
\text{PRED} & \text{MARRY(SUBJ,OBJ)}' \\
\text{SUBJ} & j : \text{PRED} '\text{JOHN}' \\
\text{OBJ} & r : \text{PRED} '\text{ROSA}'
\end{bmatrix} \]

\[ m_{\sigma} : \begin{bmatrix}
\text{TOPIC} & \{ \text{john:} j_{\sigma} \} \\
\text{FOCUS} & \{ \lambda y. \lambda x. \text{marry}(x, y): r_{\sigma} \circ (j_{\sigma} \circ m_{\sigma}) \}
\end{bmatrix} \]

Using abbreviations: Simpler representations

\[ \begin{tikzpicture}
\node (IP) at (0,0) {IP};
\node (NP) at (-1,-1) {NP};
\node (VP) at (1,-1) {VP};
\node (N) at (-2,-2) {N};
\node (N') at (2,-2) {N'};
\node (V) at (0,-2) {V};
\node (Np) at (-2,-3) {John};
\node (Np) at (2,-3) {Rosa};
\node (Np) at (-1,-3) {married};
\node (Np) at (1,-3) {married};

\draw[->] (IP) -- (NP);
\draw[->] (NP) -- (VP);
\draw[->] (VP) -- (V);
\draw[->] (V) -- (N);
\draw[->] (V) -- (N');
\draw[->] (N) -- (Np);
\draw[->] (N') -- (Np);
\draw[->] (Np) -- (NP);
\draw[->] (Np) -- (VP);
\draw[->] (NP) -- (Np);
\draw[->] (VP) -- (Np);

\node at (3,-1) {\text{TOPIC} \{ \text{John} \}};
\node at (3,-2) {\text{FOCUS} \{ \text{married} \}};
\node at (-3,-1) {\text{TOPIC} \{ \text{married} \}};
\node at (-3,-2) {\text{FOCUS} \{ \text{Rosa} \}};
\end{tikzpicture} \]
Simpler representations

married-Rosa can be derived from the premises married and Rosa:

![Diagram of the derivation of married-Rosa]

Specification of information structure role in semantic structure

- Each meaning constructor is required to take on some information structure role (i.e., to appear in the appropriate set at information structure).
- Which role it takes on can be specified in various ways: agreement, casemarking, word order, prosody, ...
- How to accomplish this: Specify the information structure role of a meaning constructor as the value of the attribute DF in its semantic structure. This allows for instantiation of information structure roles by various modules of the grammar.
- We can then use the value of that attribute to assign the appropriate role at information structure.

Revised lexical entries

Each meaning contribution must bear some information structure role, specified as a feature at semantic structure:

John N (↑ PRED) = ‘JOHN’

john ∈ (↑σ (↑σ DF))

The meaning constructor john (defined as john:↑σ) is a member of the set value of the discourse function signified by (↑σ DF) within the information structure ↑σ. (This is similar to the treatment of PCASE in early treatments of obliques.)
Phrase structure rules

Subject as the default topic:

\[ \text{IP} \rightarrow \text{NP} \quad \text{I'} \]

\[ (\uparrow \text{SUBJ})=\downarrow \quad \uparrow =\downarrow \]

\[ \uparrow_{\sigma_1}=\downarrow_{\sigma_1} \]

\[ ((j_\sigma \text{ DF})=\text{TOPIC}) \]

Relations between structures

\[ \text{IP} \quad \text{NP} \]

\[ (m \text{ SUBJ})=j \quad m_{\sigma_1}=j_{\sigma_1} \]

\[ ((j_\sigma \text{ DF})=\text{TOPIC}) \]

\[ \text{N'} \]

\[ \text{N} \]

\[ \text{John} \]

\[ (j \text{ PRED}) = '\text{JOHN}' \]

\[ \text{john} \in (j_{\sigma_1}, (j_\sigma \text{ DF})) \]

Functional description

\[ (m \text{ SUBJ})=j \]

\[ m_{\sigma_1}=j_{\sigma_1} \]

\[ ((j_\sigma \text{ DF})=\text{TOPIC}) \]

\[ (j \text{ PRED}) = '\text{JOHN}' \]

\[ \text{john} \in (j_{\sigma_1}, (j_\sigma \text{ DF})) \]

Functional description

- \[ m_{\sigma_1}=j_{\sigma_1} \]: requires the information structure corresponding to \( m \) and \( j \) to be the same. We assume that all members of a clause share the same information structure. The result is that specifying a particular information structure role for a meaning constructor means that it bears that information structure role within the entire clause.

- \[ ((j_\sigma \text{ DF})=\text{TOPIC}) \] provides an optional, default discourse function \( \text{TOPIC} \) for the subject.

- \[ \text{john} \in (j_{\sigma_1}, (j_\sigma \text{ DF})) \]: the meaning constructor \( \text{john} \) must bear the information-structure role specified by \( (j_\sigma \text{ DF}) \).
Functional description

\[
\begin{align*}
((j_\sigma \text{ DF})=\text{TOPIC}) \\
\text{john} \in (j_\sigma, (j_\sigma \text{ DF})) & \equiv \text{john} \in (j_\sigma, \text{TOPIC}) \\
\end{align*}
\]

- the semantic structure \( j_\sigma \) corresponding to \( j \) has the feature \text{DF} with value \text{TOPIC}
- the value of \( j_\sigma \)'s \text{DF} appears as the feature \text{TOPIC} in the information structure for the clause, \( m_{\sigma_1} \).

Rules

\[
\begin{align*}
\text{IP} & \rightarrow \text{NP} \quad I' \\
& \quad (\uparrow \text{SUBJ})=\downarrow \quad \uparrow=\downarrow \\
& \quad (\uparrow_\sigma=\downarrow_\sigma, \\
& \quad ((\uparrow_\sigma \text{ DF})=\text{TOPIC}) \\
I' & \rightarrow \left( \begin{array}{c}
\uparrow=\downarrow \\
\end{array} \right) \quad \text{VP} \\
& \quad \uparrow=\downarrow \\
\text{VP} & \rightarrow \text{V'} \\
& \quad \uparrow=\downarrow \\
\text{V'} & \rightarrow \text{V} \\
& \quad \uparrow=\downarrow \left( \begin{array}{c}
\uparrow \text{NP} \\
\quad (\uparrow \text{OBJ})=\downarrow \\
\quad (\uparrow_\sigma=\downarrow_\sigma) \\
\end{array} \right) \\
\end{align*}
\]

Lexical entries

\[
\begin{align*}
\text{married} & \quad \text{V} \quad (\uparrow \text{ PRED}) = \text{MARRY(SUBJ,OBJ)} \\
\text{marry} & \in (\uparrow_\sigma (\uparrow_\sigma \text{ DF})) \\
\text{Rosa} & \quad \text{N} \quad (\uparrow \text{ PRED}) = \text{Rosa'} \\
\text{rosa} & \in (\uparrow_\sigma (\uparrow_\sigma \text{ DF}))
\end{align*}
\]
C-structure and f-structure

Contribution from linguistic and pragmatic context

John married Rosa

This information comes from agreement, casemarking, prosody, word order, context...

John married Rosa

(A) \( (m \text{ PRED}) = \text{`MARRY(SUBJ,OBJ)'}, (m \text{ SUBJ})=j, (m \text{ OBJ})=r, (r \text{ PRED}) = \text{`ROSA'} \) \[ m : \begin{bmatrix} \text{PRED} & \text{`MARRY(SUBJ,OBJ)'} \end{bmatrix} \]

(B) \( (j \sigma \text{ DF})=\text{TOPIC} \) \[ j_{\sigma} : [\text{DF} \ \text{TOPIC}] \]

John married Rosa

(C) \( \text{John} \in (j_{\sigma_1}, (j_{\sigma} \text{ DF})) \) \[ m_{\sigma_1} = j_{\sigma_1} \]

marry \( \in (m_{\sigma_1}, (m_{\sigma} \text{ DF})) \) \[ m_{\sigma} = m_{\sigma_1} \]

rosa \( \in (r_{\sigma_1}, (r_{\sigma} \text{ DF})) \) \[ r_{\sigma} = r_{\sigma_1} \]
John married Rosa

(C) \( \text{john} \in (m_{\sigma_t}, \text{TOPIC}) \)
\( \text{marry} \in (m_{\sigma_t}, \text{FOCUS}) \)
\( \text{rosa} \in (m_{\sigma_t}, \text{FOCUS}) \)

\[ m_{\sigma_t} : \begin{cases} \text{TOPIC} & \{ \text{john} \} \\ \text{FOCUS} & \{ \text{marry} \}, \text{rosa} \end{cases} \]

References


