Towards an ISO standard for dialogue act annotation

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Me

Speaking next

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ISO Project 24617-2

(Part 1: Time and Events – see LREC presentation yesterday by James Pustejovsky, Kiyong Lee, Harry Bunt, and Laurent Romary)
Project status

- Launched in May 2008, with accepted Working Draft
- First ballot, Fall 2009; accepted as Draft International Standard ISO DIS 24617-2 (January 2010)
- Project team:
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  - Harry Bunt (Netherlands) (PL)
  - Jean Carletta (UK)
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  - Koiti Hasida (Japan)
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Interested to participate? Contact Harry.Bunt@uvt.nl
Introduction

**Dialogue act**: specimen of communicative activity of a dialogue participant, interpreted as having a certain *communicative function* and a *semantic content*.

**Semantic content**: specification of objects, relations, actions, propositions,... that a dialogue act is about.

**Communicative function**: specification of how a dialogue act's semantic content changes the information state of an addressee (when he understands the communicative activity).
Annotating a spoken/keyed/multimodal dialogue with dialogue act information:

- identify functional segments

- mark up functional segments with:
  - communicative functions
  - category of semantic content
  - relations to other functional segments or their interpretations
  - Participants (speaker and addressee(s))
Background

- Range of dialogue act annotation schemes: TRAINS, HCRC Map Task, Verbmobil, DIT, SPAAC, C-Star, MUMIN, MRDA, AMI,...

Features:

♥ Domain-independent
♥ Concepts defined as data categories following ISO 12620 standard
♥ Multidimensional
♥ Annotation language **DiAML** (Dialogue Act Markup Language) with:
  - abstract and concrete syntax
  - semantics in terms of information-state update operators defined for *abstract* syntax
  - concrete syntax defining XML representations
Multifunctionality

A: Henry, could you take us through these slides?
H: O..w..k..ay.. just ordering my notes
Multifunctionality

A: Henry, could you take us through these slides?

*Turn Assign* to Henry; *Request*

H: O..w..k..ay.. just ordering my notes
Multifunctionality

A: Henry, could you take us through these slides?

*Turn Assign* to Henry; *Request*

H: O..w..k..ay.. just ordering my notes

*Turn Accept; Stalling; Accept Request; Inform*
Multifunctionality

A: Henry, could you take us through these slides?

*Turn Assign* to Henry; *Request*

H: O..w..k..ay.. just ordering my notes

*Turn Accept; Stalling; Accept Request; Inform*

Dimensions of communication in dialogue:

- Turn Management
- Time Management
- Task performance
- .....

Dimensions in dialogue act analysis

Criteria for distinguishing dimensions:

*each core dimension should*

- correspond to observed forms of communicative behaviour (*be empirically justified*)
- correspond to a well-established class of communicative activities (*be theoretically justified*)
- be recognizable with acceptable precision by humans and machines
- be addressable independent of other dimensions (*be ‘orthogonal’ to other dimensions*)
- be commonly represented in existing dialogue act annotation schemes

(Petukhova & Bunt, 2009)
Core dimensions

- **Task**: dialogue acts moving the underlying task forward
- **Auto-Feedback**: providing information about speaker's processing of previous utterances
- **Allo-Feedback**: providing or eliciting information about addressee's processing of previous utterances
- **Turn Management**: allocation of speaker role
- **Time Management**: managing use of time
- **Own Communication Management**: editing one's own speech
- **Partner Communication Management**: editing addressee's speech
- **Social Obligations Management**: dealing with social conventions (greeting, thanking, apologizing,..)
- **Discourse Structuring**: explicitly structuring the dialogue
Criteria for distinguishing communicative functions:

*each communicative function should*

- correspond to observed forms of communicative behaviour *(be empirically justified)*
- have a well-established semantics in terms of information-state updates *(be theoretically justified)*
- be recognizable with acceptable precision by humans and machines
- be included if necessary for achieving a good coverage of the phenomena in a given dimension
- be commonly present in existing dialogue act annotation schemes
- preferably be either mutually exclusive with the other functions available in a given dimension, or be a specialization of one
Core communicative functions

Dimension-specific communicative functions, e.g.:

- *Turn Release* (Turn Management)
- *Stalling* (Time Management)
- *Self-Correction* (Own Communication Management)
- *Completion* (Partner Communication Management)
- *Dialogue opening* (Discourse Structuring)
- *Thanking* (Social Obligations Management)

General-purpose functions, applicable in any dimension, e.g.:

- Information-seeking functions: *Propositional Question, Set Question, Check Question, Choice Question*
- Information-providing functions: *Inform, Agreement, Disagreement, Correction*
- Commissive functions: *Promise, Offer, Accept Suggestion, Decline Suggestion,* ...
- Directive functions: *Request, Instruct, Suggestion, Accept Offer, Decline Offer*
Core communicative functions

51 core communicative functions

- 21 general-purpose functions:
  4 information-seeking functions
  6 information-providing functions
  6 commissive functions
  5 directive functions

- 30 core dimension-specific functions
  2 auto-feedback functions
  3 allo-feedback functions
  6 turn management functions
  2 time management functions
  2 own communication management functions
  2 partner communication management functions
  10 social obligation management functions
  3 discourse structuring functions
Core communicative functions

All core communicative functions:

- have a definition as ISO data category, following ISO 12620 standard for concept definitions
- will eventually be entered in ISOCat registry at http://www.isocat.org/
- currently available at http://semantic-annotation.uvt.nl/
Evaluation of ISO data categories for communicative functions

- Inter-annotator agreement measurements for English and Dutch;
- 2 trained annotators working on raw text/audio

Results: **for main classes of dialogue acts almost perfect agreement**
(Rietveld & van Hout, 1993: kappa ≥ 0.80)
Evaluation of data categories for communicative functions (kappa scores)

<table>
<thead>
<tr>
<th>Function class</th>
<th>English</th>
<th>Dutch</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information-seeking</td>
<td>0.96</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>Information-providing</td>
<td>0.98</td>
<td>0.99</td>
<td>0.98</td>
</tr>
<tr>
<td>Feedback</td>
<td>0.98</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>Interaction management</td>
<td>0.92</td>
<td>0.96</td>
<td>0.94</td>
</tr>
<tr>
<td>Social obligations management</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
</tr>
</tbody>
</table>
Dialogue acts do not always have simple communicative functions:

A: Do you know when and where the next meeting will be?
B: I think it's somewhere early in September.
Dialogue acts do not always have simple communicative functions:

A: Do you know when and where the next meeting will be? **conditional request**: “please tell me … if you know”

B: I think it's somewhere early in September.
Dialogue acts do not always have simple communicative functions:

A: Do you know when and where the next meeting will be?
   *conditional request*: “please tell me … if you know”
B: I think it's somewhere early in September.
   *uncertain answer* ("I think… somewhere…")
   *partial answer*
## Communicative function qualifiers

<table>
<thead>
<tr>
<th>qualification aspect</th>
<th>qualifiers</th>
<th>communicative function class</th>
</tr>
</thead>
<tbody>
<tr>
<td>certainty</td>
<td>uncertain, certain</td>
<td>information-providing functions</td>
</tr>
<tr>
<td>conditionality</td>
<td>conditional, unconditional</td>
<td>action-discussion functions</td>
</tr>
<tr>
<td>completeness</td>
<td>partial, complete</td>
<td>responsive general-purpose functions; feedback functions</td>
</tr>
<tr>
<td>emotion/ attitude</td>
<td>[open class]</td>
<td>all communicative functions</td>
</tr>
</tbody>
</table>

*Options for emotion/attitude: happy, surprised, irritated,...*
DiAML example

P1: Do you know what time the next train to Utrecht leaves?
P2: The next train to Utrecht leaves I think at 8:32.
DiAML example - segmentation

P1: Do you know what time the next train to Utrecht leaves? = functional segment fs1
P2: The next train to Utrecht leaves I think at 8:32.

AuFB The next train to Utrecht = fs2 [positiveAutoFeedback]
TA The next train to Utrecht leaves I think at 8:32. = fs3 [answer, uncertain]
P1: Do you know what time the next train to Utrecht leaves? \textcolor{purple}{fs1} [setQuestion, conditional]

P2: The next train to Utrecht leaves I think at 8:32.

\textcolor{green}{AuFB} The next train to Utrecht \textcolor{purple}{fs2} [overallPositive]

\textcolor{blue}{TA} The next train to Utrecht leaves I think at 8:32. \textcolor{green}{fs3} [answer, uncertain]

<diaml xmlns="http://www.iso.org/diaml/">
<dialogueAct xml:id="da1" sender="#p1" addressee="#p2" target="#fs1"
    communicativeFunction="setQuestion" dimension="task"
    conditionality="conditional"/>
<dialogueAct xml:id="da2" sender="#p2" addressee="#p1" target="#fs2"
    communicativeFunction="overallPositive" dimension="autoFeedback"/>
<feedbackDependence dact="#da2" fbSegment="#fs1"/>
<dialogueAct xml:id="da3" sender="#p2" addressee="#p1" target="#fs3"
    communicativeFunction="answer" qualifier="uncertain" dimension="task"/>
<functionalDependence dact="#da3" functAntecedent="#da1"/>
</diaml>
Available at [http://semantic-annotation/uvt.nl](http://semantic-annotation/uvt.nl)

- ISO CD 24617-2 (October 2009);
- ISO DIS 24617-2 (available 7 June, 2010);
- ISO data categories for core communicative functions;
- papers reporting studies in support of developing this standard.
Thank You

Any questions?