

Towards an ISO standard for dialogue act annotation



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Me

Speaking next

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TC 37/SC 4/WG 2

Kiyong Lee, WG 2 convenor

Harry Bunt, project leader

ISO Project 24617-2
Semantic Annotation Framework, Part 2:
Dialogue Acts

(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:
 - Jan Alexandersson (Germany)
 - Harry Bunt (Netherlands) (PL)
 - Jean Carletta (UK)
 - Alex Fang (China/HK)
 - Jae-Woong Choe (Korea)
 - Koiti Hasida (Japan)
 - Olga Petukhova (Netherlands)
 - Andrei Popescu-Belis (Switzerland)
 - Claudia Soria (Italy)
 - David Traum (USA)



Expert Consulting Group

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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).



Dialogue Act Annotation

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,...
- Efforts towards domain-independence, interoperability
and standardization:
DAMSL (1997), MATE (1999), DIT++ (2005),
LIRICS (2007)



ISO standard for dialogue act annotation

Features:

- ♥ Domain-independent
- ♥ Concepts defined as data categories following ISO 12620 standard
- ♥ Multidimensional
- ♥ Annotation language **DiAML** (**D**ialogue **A**ct **M**arkup **L**anguage) 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*

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Turn Accept; Stalling; Accept Request; Inform



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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



Core communicative functions

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 \geq 0.80)

Evaluation of data categories for communicative functions (kappa scores)

<i>Function class</i>	<i>English</i>	<i>Dutch</i>	<i>average</i>
Information-seeking	0.96	0.98	0.97
Information-providing	0.98	0.99	0.98
Feedback	0.98	0.99	0.99
Interaction management	0.92	0.96	0.94
Social obligations management	0.94	0.94	0.94



Communicative function qualification

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.



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conditional request: “please tell me ... if you know”

B: I think it's somewhere early in September.



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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

<i>qualification aspect</i>	<i>qualifiers</i>	<i>communicative function class</i>
certainty	uncertain, certain	information-providing functions
conditionality	conditional, unconditional	action-discussion functions
completeness	partial, complete	responsive general-purpose functions; feedback functions
emotion/ attitude	[open class] (happy, surprised, irritated,...)	all communicative functions



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*]



DiAML example

P1: Do you know what time the next train to Utrecht leaves? **fs1** [*setQuestion, conditional*]

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

AuFB The next train to Utrecht **fs2** [*overallPositive*]

TA The next train to Utrecht leaves I think at 8:32. **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>
```



Documentation

Available at <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?

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