

Discourse markers in dialogue: relevance-theoretic analysis and corpus-based validation

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THEORETICAL ANALYSIS

Relevance-theoretic view of Discourse Markers (DM)

- DMs encode procedural information [Bla02]
- DMs facilitate the inferential process
- DMs guide the hearer towards the meaning intended by the speaker

Preliminary empirical findings

- Not all the “traditional” DMs encode procedural information
 - DM should not be considered as a homogeneous class
 - Every DM-candidate must be studied individually

Dialogue-specific feature: frequency distribution

- High proportion of *like*, *well*, etc. with respect to written texts
- Low proportion of *therefore*, *moreover*, etc.
 - e.g.: no occurrence of *therefore* and *moreover* in Switchboard (3M words)
- Difference of use between dialogues and monologues [Ste90]

DMs in coherence-based theories

- DMs indicate local coherence
 - cohesive devices
- DMs are useful to detect coherence relations (reformulation, elaboration, restatement)

DMs in natural language processing

- Rhetorical parsing of discourse
 - Based on coherence theories, e.g. RST [MT88]
 - Parse trees anchored on DM
- Annotation of “dialogue acts”
 - statement, question, back-channel, etc.
 - DMs used as indicators for machine-learning systems

CORPUS-BASED ANALYSES

Goals

- Recognize occurrences of DMs: ambiguous items
- Empirical analysis: patterns of occurrence
- NLP application: useful features for detection

Data: transcriptions of dialogues

- Staff meetings: ICSI, Berkeley (~6 hrs)
- Telephone calls: Switchboard (~100 hrs)
- Subtitles of movies: many available

Occurrence statistics

- **Task:** manual annotation of DMs from the ICSI corpus
- **RT-based criterion:** items that encode procedural information
- **Difficulty:** linguistic items are ambiguous, sometimes a DM, sometimes not
- **Influence of the data:** corpus type and size, transcription conventions

Results

- ✓ Statistics of pragmatic occurrences (DM) are consistent across the two corpora (ICSI, SWB)
- ✓ Confirmation of the discourse-type specificity of DM frequency in spoken discourse: *like*, *so*, *well* much more frequent than *nevertheless*, *therefore*
- ✓ Influence of the annotation conventions on the number of extracted DMs

Annotation by humans

- **Experiments:** subjects annotate occurrences of *like* (\pm pragmatic use)
- **Data:** ICSI (1 hr), film (2hrs) = 80 occ.
- **Guidelines:** detect pragmatic occ. (based on definition + cues + examples)
- **Variables tested:**
 - Native vs. non-native English speakers
 - Pre-planned vs. natural dialogues
 - Role of prosody

Inter-annotator agreement (κ)

- ✓ PERFECT = 1 > κ > 0 = NIL
- ✓ Importance of prosody
 - without prosodic clues, $\kappa = 0.5$
 - with prosodic clues, $\kappa = 0.8$
- ✓ Agreement equal between native EN speakers and FR speakers with good knowledge of EN
- ✓ Better agreement for pre-planned dialogues (film)

Automatic detection of DMs

- **Relevant factors:** position, prosody, patterns of collocations
- **Experiment:** use of collocation patterns to automate the annotation of pragmatic occurrences of *like*
- **Method:** exclusion of collocations such as: *something like*, *I like*, etc. (total: 26)

Results

- ✓ On the development corpus (ICSI)
 - recall = ~100%
 - precision = 75%
- ✓ On a different corpus (SWB): **test**
 - recall = ~100%
 - precision = 50%
- ➔ Method is useful as a pre-processing tool to help human annotators

Conclusion

- Reliability of human annotation depends on guidelines and media
- Automatic filtering has excellent recall and encouraging precision

Further work

- Improve automatic detection using machine-learning techniques
- Investigate the procedural information contained in other DMs

Selected references

- [Bla02] Blakemore, D. *Meaning and relevance: the semantics and pragmatics of discourse markers*. Cambridge: CUP, 2002, 200p.
- [MT88] Mann, W., Thompson, S. Rhetorical structure theory: toward a functional theory of text organization. *Text*. 1988, vol.8(3), pp. 243-281.
- [Ste90] Stenström, A.-B. *Lexical items peculiar to spoken discourse*. In J. Svartvik (ed.). *The London-Lund Corpus of Spoken English: Description and research*. Lund: LUP, 1990, pp. 137-175.

Pragmatic connectors in dialogue: relevance-theoretic analysis and corpus-based validation

The present study proposes an analysis of pragmatic connectors using relevance theory. It aims at modelling the procedural information they contain, and at showing how it can be used to improve discourse modelling for natural language processing (NLP).

Pragmatic issues are probably one of the major bottlenecks to the automatic understanding of discourse in NLP. Unfortunately, there is still a big gap between the pragmatic theories on which linguists are currently working—notably neo-gricean like Horn (1984) and Levinson (1983), and post-gricean like Sperber & Wilson (1986)—and those that are used by researchers in NLP—almost always based on speech act theory.

For that reason, in this paper I will explore the possibility to ground computational discourse modelling in Sperber and Wilson's relevance theory. I will therefore present briefly what Relevance theory tells us about discourse, based mostly on works by Reboul and Moeschler (1998), Jucker (1995) and Blakemore (2002).

I will then discuss the status of pragmatic connectors from the point of view of relevance theory, showing how various researchers working on different languages (French, Hebrew, Japanese and English) have proved the validity of a relevance-based approach to the study of pragmatic connectors (Moeschler: 2002, Rouchota: 1998). My synthesis will explain the semantic role of connectors as relevance-based constraints on the interpretation of utterances in discourse, providing a classification of their possible roles.

I will then test the validity of these theoretical results by an empirical study conducted on various corpora of texts (BNC) and dialogues (business meeting corpus of the Swiss "IM2" Project). The dialog corpus consists of more than 100 hours of meeting recordings, manually transcribed for each speaker. About 10% of the corpus is annotated with dialog acts labels from the (extended) DAMSL/Switchboard set. The study will proceed in three steps: (1) location of occurrences of pragmatic connectors (when possible, by automated means); (2) annotation of the interpretative role of each marker; (3) comparison of the annotated (observed) role with the role predicted by theoretical analysis. One of the original points of the study is the use of dialogues between more than two persons.

I will conclude by arguing that satisfactory results obtained by the empirical study can give solid ground to motivate further research on relevance theory and discourse modelling. One of the most important issue for NLP is the analysis of the various computational formalisms that could accommodate the procedural information contained in pragmatic connectors.

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- Blakemore, D. *Meaning and relevance: the semantics and pragmatics of discourse markers*. Cambridge: CUP, 2002, 208p.
- Jucker, A. *Discourse analysis and relevance*. In F. Hundsnurscher and E. Weingand, eds. *Future perspectives of dialogue analysis*. Tübingen: Max Neimeyer Verlag, 1995, pp. 121-146
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