Tense use in dialogue

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Abstract

This paper reports on parallel corpus research that shows that there are differences in tense use in written texts between parts that represent dialogue, and parts that narrate the story. This calls for further study of tense use in dialogue, both in written representations, and in spoken dialogue. Yet, in the dialogue semantics literature almost no prior work exists that is devoted to tense use, neither from a formal, nor from a computational angle. We argue that this gap in dialogue research should be filled by further empirical investigation, as well as the development of computational tools for automated annotation of tense and temporal structure in dialogue. This will not only help understand how speakers track the temporal structure of dialogue, but also give theoretical linguistic literature on tense a wider empirical and computational dimension.

1 Differences in tense use between dialogue and narrative

We (Le Bruyn et al., 2019) investigated cross-linguistic variation of tense use by looking at a parallel corpus based on the novel *Harry Potter and the Philosopher's Stone* (HP) and its translations in other languages. It will suffice here to consider only English, and select two chapters from the novel: a more narrative-oriented chapter (chapter 1), and a more dialogue-oriented one (chapter 17). After separating dialogue from narrative in the text, occurrences of the present perfect and the simple past were counted:

	PERFECT	PAST
Narrative	0	600
Dialogue	41	163

Table 1: Tense uses in chapters 1 and 17 of HP

The results show that the PERFECT is not used in the narrative part, but only in the dialogue parts. One hypothesis for this striking contrast between dialogue and narrative is that it has to do with temporal orientation. The dialogues are more likely to contain utterances of what is currently going on (relative to the story time), whereas the narrative parts tell a story that happened in the past. The traditional view is that the English PERFECT conveys current relevance; this would explain the occurrence of PERFECTS in here-and-now-oriented dialogue, and no occurrences in past-oriented narrative. This leads to the testable prediction that dialogues with a different temporal orientation have a different tense use.

2 Further investigation using the HP corpus

In order to test this hypothesis and its predictions, further empirical investigation is needed, as well as a way to formalize and quantify the notion of 'temporal orientation' that was used informally above. As for the empirical part, we start by looking at more data from the HP corpus than in Le Bruyn et al. (2019). Chapters 16 and 17 both contain dialogues, but chapter 16 is more present-oriented than chapter 17.

	PRESENT	PAST	PERFECT
Ch 16 dialogue	182	53	14
Ch 17 dialogue	126	129	22

Table 2: Raw data for tense use in chs 16 and 17 of HP.

The present orientation of Chapter 16 is confirmed by the higher PRESENT : PAST ratio. However, the number of PERFECTS is lower in Chapter 16 than in 17, whereas the hypothesis predicts a higher number. In order to further investigate these preliminary findings, and the consequences for the 'current relevance' view of the PERFECT, we need a

more fine-grained analysis of temporal orientation and tense use in dialogue. We also need to be able to scale up, and consider additional and larger dialogue corpora than just HP. Both goals require appropriate computational tools, as discussed in section 3.

3 Development of computational tools for annotating tense in dialogue

Speakers keep track of temporal orientation by parsing temporal expressions and aspect/tense inflection on verbs. Tools to automatically annotate these two categories already exist, but were not designed for dialogue. Therefore we will first provide an evaluation of how currently available tools perform on dialogue, and what improvements are needed.

Evaluation: The required computational steps can be divided into (i) syntactic parsing of tense categories and temporal expressions; and (ii) recognition of temporal links and event structure.

We include in our evaluation some tools that do the first task only: TMV, an annotator for tense/mood; SitEnt, a classifier for aspectual event type; and PerfectExtractor, software developed by one of the authors in our research project (van der Klis). A tool that is designed to do both (i) and (ii) is TARSQI (Verhagen and Pustejovsky, 2012), a toolkit that annotates texts in the ISO-TimeML format, and automatically recognizes events, times, and temporal links between them.

Since TARSQI looks the most promising, we started with that: we applied it to a set of written representations of dialogues (note that TARSQI was originally designed for the newswire domain). We found two major problems. First, with respect to task (i), it fails to recognize basic facts about English tense constructions, for example *have*+participle combinations are not recognized as a single perfect construction when non-adjacent (e.g. in questions: *Has John gone?*).

Second, in the domain of dialogue, the distinction between assertions and questions is of crucial importance. However, TARSQI does not annotate for speech act type, and therefore the time link it correctly ascribes to (1a) (time($e_{\text{book-reading}}$) $\subseteq$ yesterday) is also assigned to (1b) in which the time link is not asserted but presupposed, and to (1c) in which the establishment of the link depends on the answer. So, TARSQI also has problems with task (ii) in the specific domain of dialogue.

(1) a. Ed read a book yesterday.

b. Which book did Ed read yesterday?

c. Q: Did Ed read a book yesterday?
A: Yes. / No.

Dialogue acts: From the evaluation it follows that we should take the internal structure of dialogue seriously in our analysis. This structure typically comes in the form of annotation for Dialogue Acts (DAs), covering question-answer contrasts, but several other details in addition. In order to illustrate the virtues of a DA-based analysis of tense in dialogue, we ran a pilot study by analyzing the Switchboard corpus, which is manually annotated for DA. Because TARSQI fails here, we ran our PerfectExtractor to extract PERFECTS from the corpus. Results (see poster) show a high occurrence of PERFECTS in questions, which underlines the significance of the above remarks on computational tools having problems with question acts.

The pilot study also indicates the limitations of the Switchboard corpus. Several taxonomies of DAs contain tags relating to Topic Management, but the one used in Switchboard, DAMSL, does not (see Petukhova and Bunt, 2009). Topic Management annotation is relevant because of linguistic work that claims that the PERFECT is used in cases of "topic negotiation" (Nishiyama and Koenig, 2010) and "topic closure" (Goutsos, 1997). With dialogue data annotated for Topic Management, we are able to assess those claims in a larger empirical and computational setting.

One way to go is to use systems for automatic DA recognition (which have received a lot of attention recently, e.g. Chen et al., 2018; Kumar et al., 2018; Cerisara et al., 2018) with a taxonomy including Topic Management tags. This allows us to scale up by looking at other datasets of spoken and written dialogue that are not annotated for DA yet. The time and event annotation capacities of systems such as TARSQI are useful, but need to be improved on dialogue-specific acts. This will bring temporal annotation to dialogue, an important step toward formalizing and quantifying the notion of temporal orientation as used above in section 1.

Finally, the development of such a system will benefit a range of other applications that require access to the temporal structure of dialogue, for example in human-machine interaction settings.

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Software

TMV:	https://clarin09.ims.uni-stuttgart.de/tmv/
SitEnt:	http://www.coli.uni-saarland.de/projects/sitent/page.php
PerfectExtractor:	https://github.com/UUDigitalHumanitieslab/perfectextractor