Marked Informationally Redundant Utterances in Tutorial Dialogue

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Abstract

The paper presents a preliminary corpus study of marked Informationally Redundant Utterances (IRUs) in tutorial dialogues. The study suggests that marked IRUs have the function to make non salient propositions salient or to maintain the saliency of propositions in dialogue. This is interpreted as an indication that marked IRUs may have a greater learning effect, since students are able to recognize old information, which may help activate related knowledge and thus promote active learning.

1 Introduction

We present ongoing research on marked Informationally Redundant Utterances (henceforth IRUs) in tutorial dialogues. The work is part of the project DIALOG whose goal is to investigate the use of flexible NL dialog in tutoring mathematics and to develop a prototype gradually embodying the empirical findings (Pinkal et al., 2001).

One aspect of this goal is exploring tutoring techniques and their NL realization and implementation. In tutorial dialogues, it may be beneficial for the student (S) that the tutor (T) presents information that has been already mentioned, as S will e.g. easier memorize it. However, S will not always be able to recognize old information, unless it is marked as such. One disadvantage for S in not recognizing old information is that he may not be able to distinguish it from new material as pointed out in (Moore, 2000). Also, recognizing old information may have a greater learning effect on S as it may promote active learning, i.e. help S activate it as well as further relevant knowledge.

In the next section we describe Walker's theory of IRUs (Walker, 1993) on which the present work is based. Section 3 describes the results of our corpus study and Section 4 provides a summary.

2 Background

Walker (Walker, 1993) defines an utterance u_i as informationally redundant in a discourse situation S if u_i expresses a proposition p_i, and another utterance u_j that entails (repeats, paraphrases), presupposes or implicates p_i has already been said in S. The utterance u_j that originally added the propositional content of the IRU is the *antecedent* (ANT) of the IRU u_i. The *salience status* of ANT can be *adjacent* (ANT in previous turn), *same* (IRU in same turn as ANT), *last* (ANT in last turn of current speaker), and *remote*.

Walker considers three types of IRUs according to their *communicative function*. **Attitude IRUs** demonstrate the hearer's attitude (accept/reject) to an utterance just contributed by a speaker to the discourse situation. **Attention IRUs** make a proposition salient and are of three types. *Deliberation IRUs* make a proposition salient in order to provide a premise for an argument.[1] *Open Segment IRUs* signal a return to an earlier discussion/segment. *Close Segment IRUs* include important information, e.g. by repeating main points or making explicit causal relations. **Consequence IRUs** like *Inference-Explicit IRUs* make an infer-

[1]Deliberation IRUs can be *Warrant IRUs* which support an intention, and *Support IRUs* which support another proposition.

ence (e.g. entailment, implicature) explicit.[2]

Walker does not account of when and how IRUs can be marked as such.

3 Corpus study: Results and outlook

We investigated a corpus of German tutorial dialogues collected in a Wizard-of-Oz experiment that simulated a system for teaching proofs in naive set theory (Benzmüller and al., 2003). In the experiment, the use of NL expressions was left to the wizard's own discretion.

So far, we have identified 10 marked IRUs out of 42 IRUs in 67 dialogues. 2 IRUs were marked by *past tense* of the finite verb, 3 by means of expressions like *Der letzte Schritt war:* F (*The last step was:* F), where F is a set-theoretical formula. 1 IRU was marked by the expression *Wie wir eben festgestellt haben, [...]* (*As we have just noticed, [...]*), 2 by *wie gesagt* (*as already said*), and 2 by means of the modal particles *eben* and *ja*. All marked IRUs were uttered by T. 7 of them had an ANT uttered by T, 3 by S. None of the ANTs were adjacent or same, 6 were remote and 4 last. 3 of the IRUs were Repetitions, 7 Paraphrases, none were Inferences. All 3 Repetitions had a remote ANT, the Paraphrases of 4 ANTs were last and 3 remote. All 10 were Attention IRUs: 4 Deliberation (Support), 3 Open and 3 Close Segment.

The fact that all marked IRUs were Attention IRUs whose function is to make a non-salient proposition salient or to maintain the saliency of a proposition confirmed our expectation that marked IRUs will be used by T to provide old information that is not salient and that S may not be currently aware of but that is relevant for solving the task. It remains to be examined in what way the marked IRUs differ from the ones that are not marked.

The observation that all marked Repetition IRUs were remote runs against Walker's findings. This may have to do with the mathematical domain where repetition is natural as precision is essential, as well as with the tutorial dialogue genre where repeating given information rather than referring to it may help avoid ambiguities which could lower the learning effect. It remains to be seen whether this depends on the type of IRU (marked vs non-marked) or it is domain specific.

Another finding that seems to be genre specific is that we haven't come across marked Open Segment IRUs that are uttered by S.[3] We also didn't find Close Segment IRUs uttered by S. This may have to do with the fact that it is usually T who is in control of the dialogue and decides when a topic is closed or a (sub)task completed.

The study also suggests that some markers may only be used with IRUs that have a particular relation to their ANTs, e.g. *Der letzte Schritt war* F is only used to mark IRUs that are Repetitions.

Further work will explore possible correlations between IRU-markers, type of relation to ANT and communicative function. The claim that marked IRUs increase the learning effect also will be tested in subsequent experiments.

4 Summary

We presented the preliminary results of a corpus study that has the goal to explore the role of marked IRUs in tutorial dialogues. The study yielded that all marked IRUs were Attention IRUs whose function is to make a proposition salient thus confirming the intuition that marked IRUs will be used by T to provide old information which is relevant for solving the task at hand and which S may not be currently aware of.[4]

References

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[2] See (Walker, 1993) for more detailed descriptions.

[3] We have found however unmarked cases where S used an Open Segment IRU to return to a point that he needs T to clarify.

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