

# Closing the Gap Between Discourse Structure and Communicative Intention

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## 1 Introduction

In the past, quite a few phenomena related to discourse structures have been studied, such as lexical cohesion (Halliday and Hasan, 1976), coherence relation (Hobbs, 1985; Wu and Lytinen, 1989), and rhetorical relation (Mann and Thompson, 1988). On the other hand, there also exists abundant research on communicative intention such as speech act theory (Searle, 1968) and relevance maxim (Wilson and Sperber, 1986). One logical question to ask is then:

What is the relationship between discourse structures and communicative intention?

In the following, we shall take an *objective* approach to bridging the gap between these two sets of phenomena. More specifically, certain discourse structures and communicative intentions are taken, as literally as possible, from their “native” theories; Then, without any predefined framework, we observe the emergence of an integral discourse model encompassing these structures and intentions via necessary “bridging” knowledge and inferences. Thus, on the one hand, our integrative views toward discourse structures and intentions are similar to (Grosz and Sidner, 1986) and (Moore and Pollack, 1992) in the sense that we hold

- The separation of attentional and intentional “tracks” of discourse<sup>1</sup>.
- The stratification of coherence (informational) and rhetorical (intentional) relations.

On the other hand, unlike previous work, we formulate knowledge sources which *explain* how the emergence of integrated discourse model is possible, rather than just identifying such integration. In particular, the following knowledge sources are identified:

**KN-LC** which associate concepts denoted by words (anchoring Lexical Cohesion)

**KN-SA** which interpret utterances in terms of the speaker’s mental models which consist of propositions embedded in attitude contexts (anchoring Speech Acts)

**KN-CR** which specify a domain theory of physical world (anchoring Coherence Relations)

**KN-RR** which specify a domain theory of mental dynamics (anchoring Rhetorical Relations)

The above four knowledge sources in turns are governed by the ultimate principles of Relevance Maxim (KN-RM). In short, by explicating the knowledge behind discourse structures and intentions, we advocate that the stratification of discourse structures and intentions is motivated/supported by modularized, but related, knowledge sources.

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<sup>1</sup>This, however, will not be discussed here; interested readers are referred to (Wu, 1993) for some discussion.

## 2 A concrete example

In the following, we propose a sequence of specific questions concerning lexical cohesions (LC), coherence relations (CR), rhetorical relations (RR), speech acts (SA), and conversational maxims (CM); more specifically, we intend to demonstrate the following strata

- X coherence relation encompasses Y lexical cohesion (CR > LC).
- X rhetorical relation encompasses Y coherence relation (RR > CR).
- X speech act is achieved by Y rhetorical relation (SA > RR).
- X relevance maxim is obeyed by Y speech act (RM > SA).

Let's look at an example which is composed for an independent purpose; It is taken from (Mann and Thompson, 1986):

(S1) I love to collect classic automobiles.

(S2) My favorite car is my 1887 Duryea.

First, let's observe that the semantic/propositional interpretation of S1 and S2 yields the following (main) propositions:

LOVE(I, { a | OLD(a) & AUTOMOBILE(a) })

FAVORITE(I, b), CAR(b), b = 1887-Duryea

That is, I love antique automobiles and my favorite car is the 1887 Duryea. By detecting the following lexical cohesions (between the words denoting the concepts):

KN-LC-1:

'CAR' is a synonym of 'AUTOMOBILE'

'FAVORITE' is similar to 'LOVE'

We conclude the following coherence relation,

Exemplification(S2, S1) – (F1)

since as (Hobbs, 1985) defines it, we can

KN-CR-1:

Infer p(A) from S1 and p(a) from S2, where a is a member or subset of A

in our case, 'p' is 'LOVE' (or 'FAVORITE') and 'A' is the set of automobiles and 'a' is the car (my 1887 Duryea).

Now, we have demonstrated the connection between coherence relations and lexical cohesions. Let's look at how this is connected to rhetorical relations and speech acts. First, we need to extend the interpretation of S1 and S2 from purely propositional to including propositional attitudes (Cf. (Cohen and Levesque, 1990), (Wu and Lytinen, 1991) and (Wu and Lytinen, 1992)),

KN-SA-1:

S1 = BEL(Spkr, LOVE(Spkr, { a | OLD(a) & AUTOMOBILE(a) })) – (F2)

S2 = BEL(Spkr, (FAVORITE(Spkr, b), CAR(b), b = 1887-Duryea))

That is, the speaker (spkr) ‘believes,’ as well as ‘stated,’ that S1 and S2. In order to conceive the intention behind the speaker’s making S2, it is reasonable to assume that

MBEL(Hr, Spkr, ?BEL(Hr, LOVE(Spkr, { a | OLD(a) & AUTOMOBILE(a) }))) – (F3)

That is, the speaker and the hearer (Hr) mutually believe (MBEL) that the hearer weakly believes (?BEL) S1. Thus, in order to facilitate the “acceptance” of S1, the speaker uses S2 as an ‘evidence’ to support S1. That is, the following speech act and rhetorical relation are achieved simultaneously.

ASSERT(Spkr, S1) and Evidence(S2, S1)

The Evidence rhetorical relation is achieved through associating the following knowledge concerning persuasiveness and the Exemplification coherence relation (an instance of which is recognized in F1):

(KN-RR-1)

IF the speaker provides more detailed information about a fact P (such as stating an example of P)

THEN the hearer is more obliged to believe P (because the speaker really wants him to believe P)

Once the Evidence rhetorical relation is recognized, the hearer recognizes that the speaker really wants him to believe P from the THEN-part of KN-RR-1:

WANT(Spkr, Hr, BEL(Hr, LOVE(Spkr, { a | OLD(a) & AUTOMOBILE(a) }))) – (F4)

Based on F2, F3 and F4, the hearer has recognized, according to Searle, the *sincerity*, the *preparatory*, and the *essential* conditions of the Assertion speech act, respectively. Together with the Evidence rhetorical relation, it is clear that the speaker is making an assertion.

Now, the last question remains as which relevance maxim has been obeyed during the above process. According to (Sperber and Wilson, 1986), relevance is obeyed by producing the following contextual effects (KN-RMs) (1) enhancing a statement (2) canceling a statement (3) introducing a statement. Thus, in S2, the speaker has addressed the relevance by producing a definite contextual effects to enhance the certainty of a proposition.

### 3 Discussion and conclusion

In summary, we have demonstrated through tracing detailed examples that an integrated model of discourse does encompass discourse structures and intentions. We also take an objective approach in arguing so, since we do not predefine any framework to demonstrate our thesis; Rather, we follow existing theories and by identifying the necessary bridging knowledge and inferences, we just observe the integration emerging out of the individual discourse structures and intentions as defined in their native theories.

This integrative view is similar to others, e.g., (Grosz and Sidner, 1986) and (Moore and Pollack, 1992). Due to the lack of space, we did not deal with the full ranges of issues, but many of our positions are identical to others, in particular:

1. Discourse structure and intention form a strata

2. Many to many mapping exists between adjacent layers of the strata, e.g., between coherence and rhetorical relations for both text generation and interpretation
3. The nucleus and satellite, if exist, may not coincide between two adjacent layers.

What we have demonstrated in this paper is a particular (one-to-one) instance of a strata of discourse structure and intention. To be more specific, we demonstrate how a lexical cohesion gives rise to coherence relation; a coherence relation to a rhetorical relation; then to a speech act and a relevance maxim. In doing so, we feel we have extended the research in the following ways

- Address a wider range of strata; not only between coherence and rhetorical relations, but all the way from lexical cohesions till relevance maxims;
- Formulate knowledge which explain the emergence of such connections between layers of discourse

The second point has been kept in the background in many previous research. For example, now it can be readily understood that an Exemplification coherence relation can give rise to an Evidence rhetorical relation. However, knowledge such as (KN-RR-1) is kept implicit; but upon closer inspection, it becomes obvious without such knowledge the connection between Exemplification and Evidence can not be established. Thus, flushing out the explanatory theory for the mapping between discourse strata has been identified as our most urgent research topic. In particular, the knowledge in the maxim level (KN-RM) is much in need of further study, especially with respect to other layers of the strata.

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