

# Towards stratification of RST

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## 1 Introduction

Moore and Pollack have recently given an analysis of RST relations in terms of *intentional* versus *informational* levels of discourse [5]. According to their (convincing) analysis, presentational RST relations correspond to the intentional level of discourse and subject matter relations to the informational level. For each text there should exist two RST analyses: one containing only presentational relations and the other containing only subject matter relations. Mann and Thompson had discussed multiple analyses in RST ([1], pp. 26–30), stating that a presentational analysis is the *only* analysis when both presentational and subject-matter relation definitions are satisfied between a given pair of text spans. In their view, the presentational analysis is chosen as correct since it describes the changes in the hearer’s system of beliefs, i.e. provides deeper insights into discourse goals. Moore and Pollack, however, argue that these two analyses should not compete; instead, “a complete model of discourse structure must maintain both levels of relation”.

In this paper we take this argument one small step further and suggest a way these two levels might be organized into a stratified structure. Our discussion here has a very narrow focus and does not attempt to answer such important questions as whether the RST collection of presentational relations is exhaustive and adequate for describing all possible intentional structures.

## 2 Analogy with “Meaning” vs. “Means” in MTT

In Meaning–Text theory (MTT), when there are two (or more) alternative analyses of text which (according to intuition) belong to distinct levels of representation, one should ask whether one of them can be seen as *a means* of expressing the other. Moore and Pollack argue for co-existence of intentional (presentational) and informational (subject matter) analyses, but they do not attempt to describe the relationship between them. They show that there is no one-to-one mapping between presentational and subject matter relations, and moreover, that the presentational and subject matter analyses may have different structures (e.g., the presentational and subject matter relations may have opposite directionality, [5], pp. 542– 543). Their conclusion is that there is no easy way to relate these two levels.

From the viewpoint of MTT, however, the intentional vs. informational dichotomy observed by Moore and Pollack appears quite natural. An analogy can be seen with the relationship between the semantic and deep syntactic levels in MTT: semantic relations are in a many-to-many correspondence with deep syntactic relations. Moreover, there is no isomorphism or even preservation

of structure between a semantic graph and a deep syntactic tree which expresses it. For example, on the semantic level, an adverb such as *often* is typically analyzed as a predicate whose argument (i.e., dependent) is the remaining sentence graph. On the (deep) syntactic level, the same adverb is a dependent of the main verb. Thus the direction of dependency can easily change as one passes from semantics to syntax.

Following this analogy, we propose to consider the informational level of discourse as a means of expressing the intentional level. Intuitively, this seems quite plausible because informing the hearer about informational relations between discourse elements can hardly be considered a self-sufficient goal. Moore and Pollack stress that the intentional level is the primary one since it describes the speaker's strategy to achieve her intentional goal.

In keeping with MTT methodology, to give substance to a claim of separate strata, one must produce a system of rules that map the relations of the "meaning" level to the relations of the "means" level. Each "meaning" relation can map to many "means" relations (or combinations of such relations) and vice versa, one and the same "means" relation can appear in more than one mapping rule. Each rule describes the contextual conditions for its application in enough detail to justify the distinction between various "means", if such exist.

At the moment, we can give only a few examples of such mapping rules, one of which we present below. Nevertheless, we present this very preliminary analysis for purposes of discussion, in the belief that work in discourse representation is crucial for text generation theory and applications.

A stratificational view has significant implications. One of these is to eliminate linear order from the description of intentional RST relations. Note that in RST a given intentional relation may hold between two text segments appearing in either order provided that appropriate discourse connectives are used. In our view, linear order and, correspondingly, discourse connectives should appear only on the informational level. Abstract intentional relations express only the dependencies between propositions, not the lexical or "syntactic" artifacts associated with the means of their expression.

### 3 Example of One-to-Many Mapping

The following example, taken from Moore and Pollack, shows a one-to-many mapping from an intentional relation to various informational relations.

- (1a) George Bush supports big business.
- (1b) He's sure to veto House Bill 1711.

In Moore and Pollack's analysis, (1a) and (1b) are connected by the intentional relation **Evidence**. In particular, satellite (1a), is given as **Evidence**, to increase the hearer's belief in nucleus (1b). The hearer is assumed to believe (1a) or find it credible.

Moore and Pollack show that the same example admits an analysis on the informational level in terms of the **Volitional Cause** relation. In our terms, this would mean that the intentional relation **Evidence** can be realized by the informational relation **Volitional Cause** under certain conditions. If there are other informational relations that are capable of realizing the same intentional relation, these conditions should clearly identify the application context for each informational relation.

Another informational relation capable of realizing **Evidence** is **Non-Volitional Cause**, as shown in text (2a-2b):

- (2a) Winters in Montreal are so cold.
- (2b) (Therefore,) I need a fur coat (*faux*, of course).

To increase the hearer's belief in nucleus (2b), the speaker uses satellite (2a) as **Evidence**. On the informational level these two propositions are connected by a **Non-Volitional Cause** relation.

Another example of an informational relation realizing **Evidence** comes from Mann and Thompson, who admit that some texts can be given analyses in terms of both **Evidence** and **Elaboration** [1]. Consider a modification of (1a-1b) above:

(3a) George Bush definitely supports big business.

(3b) (Look,) He just vetoed House Bill 1711.

Here, (3a) is nucleus and (3b) is satellite, given as **Evidence** to increase the hearer's belief in (3a). On the informational level these two propositions can be seen as connected by **Elaboration**, where (3b) is a concrete instance of a more general proposition (3a). In contrast, in both examples 1 and 2 the satellite (1a,2a) was a general proposition.

We offer the following sketch of an Intentional-to-informational mapping rule:

If the intentional relation **Evidence** holds between two propositions P1 and P2, where P1 is a nucleus and P2 is a satellite,

then,

if P1 is a general proposition (i.e. the equivalent of a common sense "law" is given as **Evidence**),

then

if there is a conscious agent such that both P1 and P2 refer to her actions,

then the **Volitional Cause** informational relation can be chosen;

else (if there is no agent in P1 and P2 as described above),

then the **Non-Volitional Cause** informational relation can be chosen;

if P2 is a general proposition,

then the **Elaboration** information relation can be chosen.

## 4 Example of Many-to-One Mapping

Moore and Pollack also give an example of text spans which are in the **Condition** relation on the informational level and, depending on the reading, either in the **Enablement** or **Motivation** relation on the intentional level.

(5a) Come home by 5:00.

(5b) Then we can go to the hardware store before it closes.

First reading (**Condition/Enablement**): the speaker is interested in increasing the hearer's ability to perform the action described in (5b). Second reading: the speaker is just interested in motivating the hearer to do (5a) (because, say, a surprise party is planned).

Viewing this example from our perspective, both intentional relations, **Enablement** and **Motivation**, can be realized on the informational level by **Condition**. This is quite analogous to the way in which an ambiguous sentence may be the common syntactic realization of two distinct semantic structures. Also, there is no linear order (or *then* connective) on the intentional level. But there is a direction of dependency of satellite on nucleus. The directionality of the dependency relation is preserved in the **Enablement/Condition** pair, and is reversed in the **Motivation/Condition** pair. As noted above, dependency reversal is not surprising when one maps between distinct levels of description.

## References

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