RST and Practical Reasoning Argumentation Schemes

Nancy L. Green[1]

[1]*University of North Carolina Greensboro, Greensboro, NC 27402, USA*

Abstract

The relationship of discourse structure as modeled in Rhetorical Structure Theory to argumentation is an interesting open question. A barrier to research is that currently there are no corpora of naturally occurring monological texts annotated both with RST and argumentation scheme structures. The main contribution of this paper is to provide insights on the relationship of RST and argumentation scheme structures based upon our analyses of some texts involving practical reasoning.

Keywords

Rhetorical Structure Theory, Argumentation Schemes, Practical Reasoning

1. Introduction

In Rhetorical Structure Theory (RST), certain coherence relations are used to describe the discourse structure of monological text [7]. RST parsers have been implemented using machine learning to classify RST relations based on readily identifiable text features. It has been suggested that "a potentially useful architecture for argument mining could involve an RST parser as an early step" [9]. Thus, computational researchers have begun to explore the relationship of coherence relations to argumentation schemes and structures in corpora [2, 9]. Furthermore, the relationship of RST to argumentation is of theoretical interest since discourse structure plays a role in interpretation of text. However, there are currently no corpora of naturally occurring monological texts containing both annotated RST analyses and argumentation analyses (see Related Work). To address this problem, we focus on the relationship of RST structures to argumentation scheme structures involved in practical reasoning (PR), argumentation in support of an agent's decision to act in a certain way. Argumentation scheme structures are hierarchical structures of instantiated PR-related argumentation schemes, including means-end practical reasoning, argument from consequences, argument from consequences to evaluation, argument from value, and argument from classification [6]. In this paper, we have added our argumentation scheme structure analysis to some analyses from the RST literature, and added our RST analysis to several analyses of practical reasoning by argumentation scholars. Although too small to serve as a corpus for machine learning, we use these examples to provide some insights into the relationship of RST and argumentation.

2. From RST to PR

In this section we present several RST analyses from the RST literature, and provide our analysis of the PR-related argumentation scheme structure of the same texts. The examples illustrate the key role of the RST relation of Motivation in PR. According to the definition of Motivation, the satellite (S) is intended to

increase the reader's desire to perform the action described in the nucleus (N).[2] Consider Example I[3] [7, p. 76-7]. The RST analysis given in [7] is shown in Figure 1, using an alternate notation that we have devised for the sake of compactness. (To aid in balancing left and right brackets, right brackets are annotated with the relation name immediately following the matching left bracket.) We analyze this text as an instance of argument from negative consequences[4] with the premise, pragmatically implied by unit 7, that if you don't fill out a new form then your listed beneficiary may not be correct, and the conclusion, conveyed in unit 5, that you should complete new retirement and insurance forms. So, this example shows a simple correspondence between the nucleus and satellite of Motivation and the conclusion and a premise, respectively, of argument from consequences.

Example I
5A) Employees 6) who are not sure of who is listed as their beneficiary 5B) should complete new forms 7) since the retirement system and the insurance carrier use the most current form…
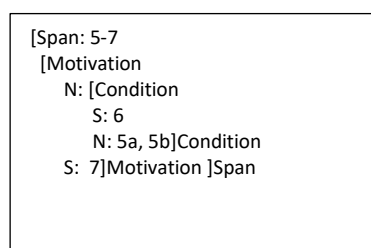
```
[Span: 5-7
  [Motivation
      N: [Condition
          S: 6
          N: 5a, 5b]Condition
      S: 7]Motivation ]Span
```

```
[Span: 1-4
  [Enablement
      N: 1
      S: 2]Enablement
  [Motivation
      N: 1
      S: 3]Motivation
  [Motivation
      N: 1
      S: 4]Motivation ]Span
```

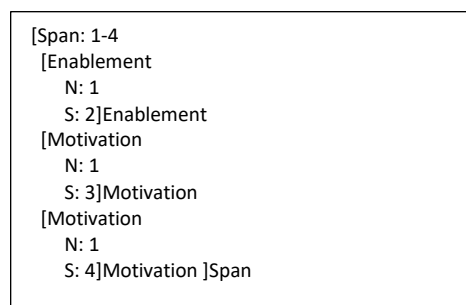**Figure 1.** RST analysis of Example I   **Figure 2.** RST analysis of Example II

Now consider Example II, another example of Motivation in naturally occurring text (a note affixed to a workplace bulletin board) [7, p. 56]. Figure 2 shows the RST analysis in [7] in our notation, where unit 1 is the nucleus in three relation instances: Enablement[5] (with satellite, unit 2), Motivation (with satellite, unit 3), and Motivation (with satellite, unit 4). "Clearly, units 3 and 4 are intended to motivate the author's co-workers to attend the performance" (p. 56).

Example II
1) The Los Angeles Chamber Ballet (the ballet company I'm dancing with) is giving 4 concerts next week. 2) Tickets are $7.50 … 3) The show is made up of new choreography and should be very entertaining. 4) I'm in 3 pieces.

One could analyze this as two instances of argument from positive consequences, each having the conclusion, derived as a pragmatic inference from unit 1, that the reader should attend (some of) the concerts. The premise of one of the arguments, derived by pragmatic inference from unit 3, is that the reader will enjoy the concerts; and the premise of the other, suggested by unit 4, is that the writer will appreciate

---

[2] It is assumed that the reader has at least basic familiarity with RST [7]. For reasons of space, we do not provide full definitions of RST relations cited in our paper. More information, including full definitions, is available at https://www.sfu.ca/rst. See also [3] for definitions and an extension to the original set of relations.

[3] In this and other examples from the RST literature, discourse units are numbered as in the source.

[4] It is assumed also that the reader has some familiarity with argumentation schemes described in [10]. Although, due to space constraints, we cannot provide definitions, it is hoped that the examples will be self-explanatory.

[5] According to the definition of Enablement, comprehending the satellite increases the reader's ability to perform the action described in the nucleus [7].

the coworkers' support. Again, the nucleus and satellite of Motivation instances align with components of argument from consequences.

Next consider Example III, from https://www.sfu.ca/rst, a letter sent by the political advocacy group, California Common Cause. Its analysis, given on the RST website, is shown in Figure 3 in our notation.

Example III
1) I don't believe that endorsing the Nuclear Freeze Initiative is the right step for California Common Cause. 2) Tempting as it may be, 3) we shouldn't embrace every popular issue that comes along. 4) When we do so, 5) we use precious, limited resources 6) where other players with superior resources are already doing an adequate job. 7) Rather, I think we will be stronger and more effective 8) if we stick to those issues of governmental structure and process, broadly defined, that have formed the core of our agenda for years. 9) Open government, campaign finance reform, and fighting the influence of special interests and big money, these are our kinds of issues. 10) Let's be clear: 11) I personally favor the initiative and ardently support disarmament negotiations to reduce the risk of war. 12) But I don't think endorsing a specific nuclear freeze proposal is appropriate for CCC. 13) We should limit our involvement in defense and weaponry to matters of process, such as exposing the weapons industry's influence on the political process. 14) Therefore, I urge you to vote against a CCC endorsement of the nuclear freeze initiative.

```
[Span: 1-14
 [Motivation
  N: 14
  S: [Evidence
      N: 1
      S: [Antithesis
          N: 7-9
          S: 2-6]Antithesis ]Evidence ]Motivation
[Motivation
 N: 14
 S: [Evidence
     N: 1
     S: [Justify
        N: [Concession
            N: [Antithesis
                N: 13
                S: 12] Antithesis
            S: 11]Concession
        S: 10]Justify]Evidence ]Motivation ]Span
```

```
[Antithesis
 N: [Elaboration
     N: [Condition
         N: 7
         S:  8]Condition
     S: 9]Elaboration
 S: [Evidence
     N: [Concession
         N: 3
         S:  2]Concession
     S: [Condition
         N: [Contrast
             N: 5
             N: 6]Contrast
         S: 4]Condition]Evidence]Antithesis
```

**Figure 3a**. Part of RST analysis of Example III. **Figure 3b.** Details of unit 2-9 in Fig. 3a.

In the RST analysis, unit 14 is the nucleus in two instances of Motivation; and in each instance the satellite of Motivation is a structure headed by an instance of the relation of Evidence. According to the definition of Evidence in RST [7], S is intended to increase the reader's belief in N, i.e., unit 2-9 (the satellite of the first Evidence instance) is intended to increase the reader's belief in unit 1, and similarly unit 10-13 is intended to increase the reader's belief in unit 1. Each of these satellites has a complex structure. As shown in Figure 3a, unit 2-9 is analyzed as an instance of the Antithesis relation. Antithesis is defined as a relation between two contrasting situations, where "the writer has positive regard for N", "one cannot have positive regard for both of those situations" and "comprehending S [e.g. unit 2-6 in Fig. 3a] and the incompatibility between the situations" is intended to increase the reader's positive regard for N [e.g. unit 7-9 in Fig. 3a]. Details shown in Fig. 3b involve the RST relation of Concession, which will be discussed later.

Returning to the second instance of Motivation in Fig. 3a, its nucleus is unit 14 and its satellite is headed by a relation of Evidence whose nucleus is unit 1. However, in this case the satellite of the instance of Evidence is a structure headed by the RST relation Justify, whose definition states that "R's [the reader's]

comprehending S increases R's readiness to accept W's [the writer's] right to present N" [7]. Again ignoring details involving Concession, the key point is that the most important information in this structure is the instance of Antithesis with nucleus unit 13 and satellite unit 12.

Unlike the preceding examples of argument from consequences, in Figure 4 we analyze this text using several other PR-related argumentation schemes: means-end practical reasoning, argument from consequences to evaluation, and argument from value [10, 6].[6] The conclusion of the argument, conveyed in unit 14, is that the reader should "vote against a CCC endorsement of the nuclear freeze initiative." The goals premise of PR is suggested in unit 7. The alternative of voting against endorsement is suggested in unit 1: "I don't believe that endorsing … is the right step …". Four reasons are given for the evaluation that endorsing is not the right step. First, according to an argument from consequences to evaluation, endorsing the freeze wastes resources (unit 4-6); second, another argument from consequences to evaluation is that CCC will be "stronger and more effective" if they don't endorse the freeze (unit 7-9); third, according to an argument from value, endorsing the freeze is not "appropriate for CCC" (unit 12); and fourth, another argument from value is that it is preferable to limit CCC's involvement to "matters of process" rather than endorsing specific proposals (unit 13).

It is clear that there is no simple alignment between the PR and RST structures for Example III. However, the conclusion of PR does map to the nucleus of Motivation, and the selection premise maps to (the nucleus of) the satellite (structure) given to motivate the action. Also, some argumentation in support of unit 1 maps to an instance of Antithesis. The satellite of the Antithesis (unit 4-6) provides negative consequences for evaluating endorsing as not right, and the nucleus (unit 7-9) provides positive consequences for evaluating endorsing as not right. In addition, another instance of Antithesis is used in support of unit 1: unit 12 and unit 13 each provide an argument from value for the premise that endorsing is undesirable (a negative reason as the satellite of Antithesis and a positive reason as the nucleus of Antithesis, respectively).
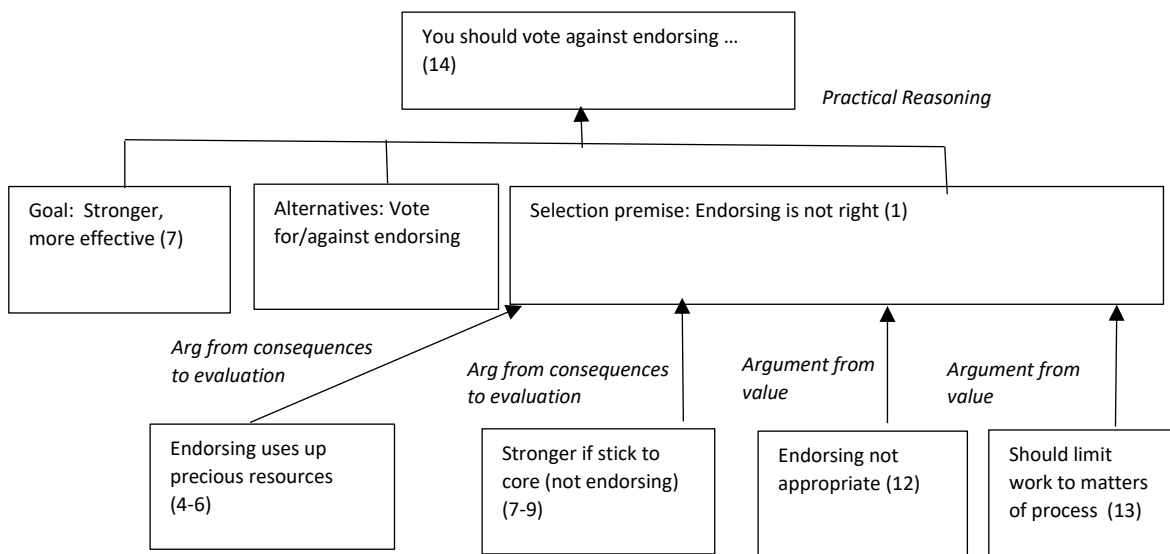
Figure 4. Our analysis of argumentation in Example III

Example IV, from [7], also can be analyzed as an instance of the practical reasoning scheme. The RST analysis given in [7], shown in Figure 5 in our notation, features Solutionhood in combination with Motivation. According to the definition of Solutionhood, S presents a problem and N contains a solution

---

[6] Arguments are diagrammed in notation similar to that used in [10]. Arrows point from premises to conclusion, and the name of the argumentation scheme licensing the conclusion is given in italics beside the arrow.

to the problem [3]. In this example, unit 1 presents the problem and unit 2-15 a solution. The solution, specified in unit 2, is the nucleus of two relations, Motivation and Enablement. Unit 3-12 is presented to increase the reader's desire to perform the action in unit 2. (Unit 13-15, not shown, is presented to increase the reader's ability to perform the action in unit 2.)

Our analysis of the argument, as an instance of means-end practical reasoning, is shown in Figure 6. The claim, a pragmatic inference from unit 2 that the reader should buy/use SYNCOM diskettes, is supported by the goal premise from unit 5, that the reader's goal is no diskette errors, the circumstances premise [4] that you may be having a certain problem (unit 1), and the means-end premise from unit 3-5 that using SYNCOM diskettes can prevent such errors. The text provides four ways that SYNCOM diskettes can prevent such errors. As shown in Figure 6, each of these can be represented as a causal argument.

In this example, the instance of Motivation aligns with the means-end PR argument as follows: the conclusion (unit 2) is the nucleus of Motivation, and the four satellites of Motivation each contains (embedded in Elaboration) the means-End premise (unit 3-5) of PR. (Note that the four instances of Elaboration each provide an argument from cause to effect in support of unit 3-5.) However, unlike Example III, the instance of Motivation (unit 2-12) occurs as the nucleus of Solutionhood; the satellite of Solutionhood, describing the problem (unit 1), maps to the circumstances premise of PR.

Example IV
1) What if you're having to clean floppy drive heads too often? 2) Ask for SYNCOM diskettes, with burnished Ectype coating and dust-absorbing jacket liners. 3) As your floppy drive writes or reads, 4) a Syncom diskette is working four ways 5) to keep loose particles and dust from causing soft errors, dropouts. 6) Cleaning agents on the burnished surface of the Ectype coating actually remove build-up from the head, 7) while lubricating at the same time. 8) A carbon additive drains away static electricity 9) before it can attract dust or lint. 10) Strong binders hold the signal-carrying oxides tightly within the coating. 11A) And the non-woven jacket liner, 12) more than just wiping the surface, 11B) provides thousands of tiny pockets to keep what it collects. …
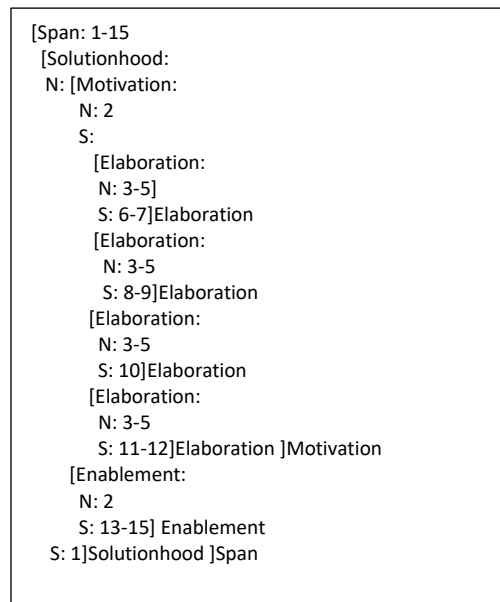
```
[Span: 1-15
 [Solutionhood:
 N: [Motivation:
     N: 2
     S:
       [Elaboration:
       N: 3-5]
       S: 6-7]Elaboration
       [Elaboration:
       N: 3-5
        S: 8-9]Elaboration
       [Elaboration:
       N: 3-5
        S: 10]Elaboration
       [Elaboration:
       N: 3-5
        S: 11-12]Elaboration ]Motivation
   [Enablement:
    N: 2
    S: 13-15] Enablement
 S: 1]Solutionhood ]Span
```
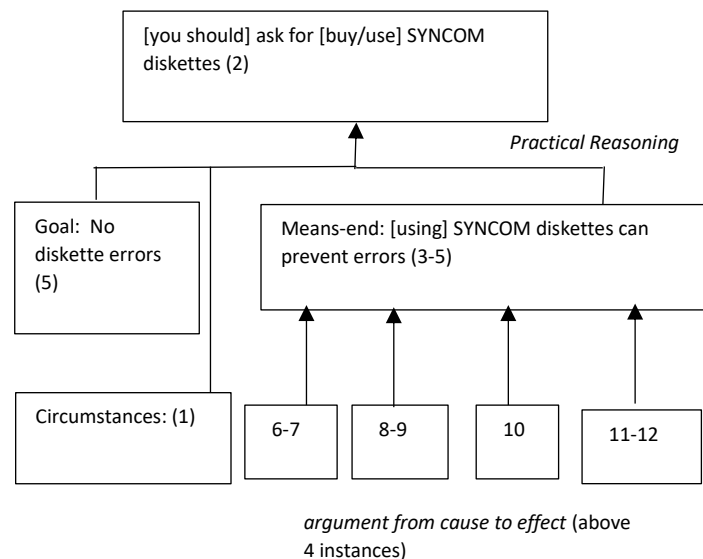
Figure 5: RST Analysis of Example IV

Figure 6: Our analysis of argumentation in Example IV

To sum up the observations about Examples I-IV, the nucleus of Motivation maps to the top-level claim of a PR argumentation structure. However, as the RST structure becomes more complex the mapping between RST structure and argumentation scheme structure becomes less straightforward. Also, RST relations do not distinguish among the various PR-related argumentation schemes.

3. From PR to RST

In this section, we present three PR analyses from the argumentation literature and provide our analysis of RST structure. First consider Example V, an excerpt from an editorial on opposing views of Putin and Obama.[7] Our RST analysis of the text is shown in Figure 7. According to the RST relation of Attribution [3], S is the source of and N is the content of reported speech; in this case, the writer has attributed (in unit 1a, 4a) the content (in unit 1b-1c, 4b-6b) to Putin. The RST analysis reflects the fact that the excerpt distinguishes the writer's point of view (unit 2-3) from Putin's view (units1b-1c), using the RST relation of Concession, defined as follows: "W [the writer] has positive regard for N, W is not claiming that S does not hold; W acknowledges a potential or apparent incompatibility between N and S; recognizing the compatibility between N and S increases R's [the reader's] positive regard for N" [7]. (The embedded Concession relation describing unit 2-3 is an instance of the "corrective" variant of Concession [3].) As shown in Fig. 7b, RST relations of Motivation and Solutionhood are used to characterize an implicitly understood problem, terrorism in Syria (unit 5), and its solution, restoring Syrian statehood (unit 6a-6b). Asad "as a force for stability" (unit 4b) is given to motivate this solution.

The argument analysis adapted from [6], is shown in Figure 8. Two means-end PR arguments support the conclusion conveyed in unit 6b. The PR structure on the left side of Fig. 8 includes several implicit propositions. The implicit premise of PR that restoring Syrian statehood is the best way of cooperating with the Syrian government and Assad is supported by an argument from consequences based upon the implicit premise that cooperating is desirable, which is supported by two arguments: an argument from consequences to evaluation based on the premise that Assad's government fights terrorism (unit 1c) and the implicit premise that fighting terrorism is desirable, and an argument from value based upon the implicit premise that stability is desirable and the premise that Assad is a force for stability (unit 4b). The simpler PR structure on the right includes a goal premise (unit 5) and means-end premise (unit 6a-6b).

Example V
1a) Mr. Putin said 1b) it was "an enormous mistake to refuse to cooperate with the Syrian government and its airforces, 1c) who are valiantly fighting terrorism face-to-face," 2) conveniently ignoring the fact that Mr. Assad's main target has always been his domestic opposition, 3) not the Islamic state. 4a) He portrayed 4b) Mr. Assad as a force for stability and said 6a) the only solution 5) [to terrorism] 6b) "is to restore their statehood where it has been destroyed."

```
[Span: 1-3
 [Concession
 N: [Concession
     N: 2
     S: 3]Concession
 S: [Attribution
     S: 1a
     N: [Motivation
        N: 1b
        S: 1c]Motivation]Attribution]Concession]Span
```

```
[Span: 4-6
 [Attribution
   S: 4a
   N: [Motivation
      N: [Solutionhood
         N: 6a, 6b
         S: 5]Solutionhood
      S: 4b]Motivation]Attribution]Span
```

Figure 7a. Our RST analysis of Putin's argument   **Figure 7b.** RST analysis (continued)

---

[7] "Putin and Obama Have Profound Differences on Syria." Editorial, The New York Times 28 September 2015. Copied from [6].
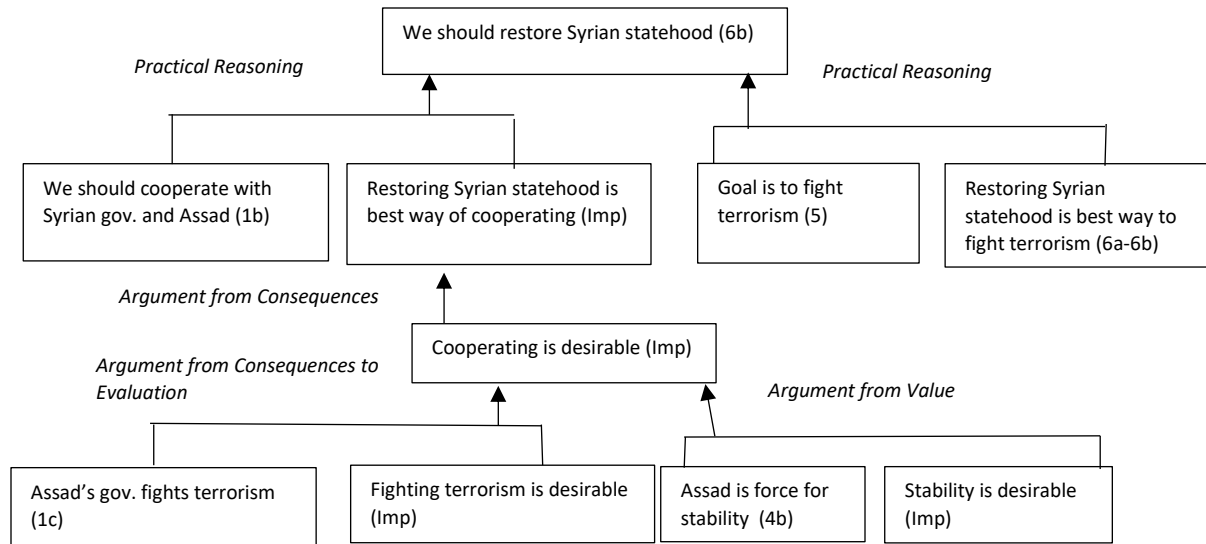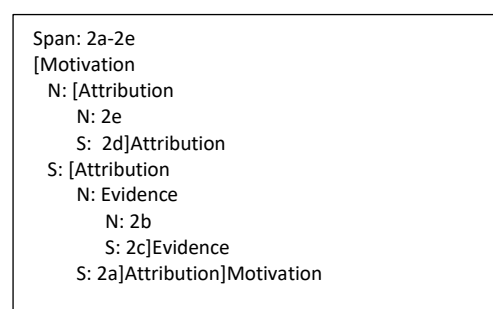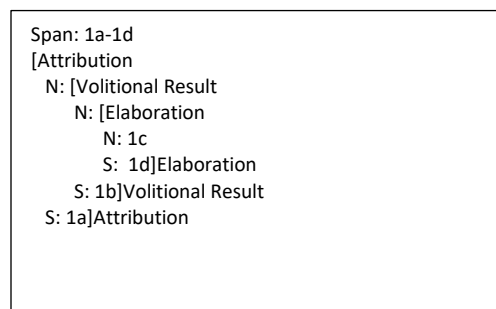
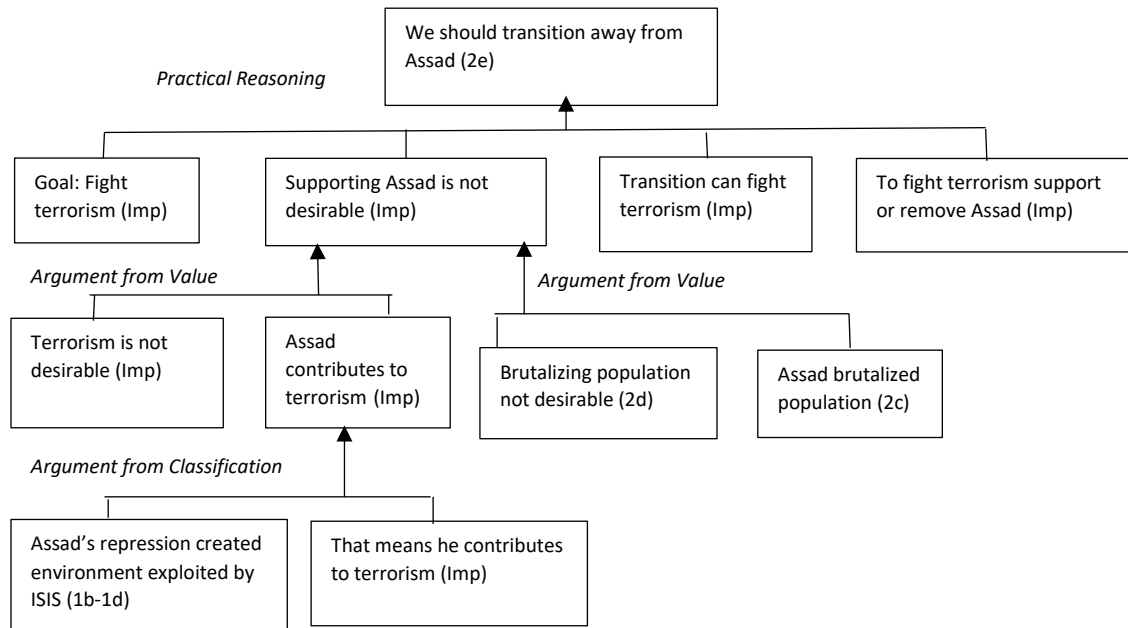**Figure 8.** PR analysis of Putin's argument (Example V) adapted from [6]

Next consider Example VI, an excerpt from the same editorial, on Obama's response to Putin's argument in Example V. Our RST analysis of the text is shown in Figure 9. In the RST analysis, attribution of content to Obama is explicitly noted as the satellite of Attribution (unit 1a, 2a, and 2d). In Fig. 9a, RST (Volitional) Result [7] is used to describe the causal relation between Assad's use of "repression and killing" (unit 1b) to its effect (unit 1c-1d). In Fig. 9b, the nucleus of (the attributed content of) Motivation is that we should transition away from Assad to a more inclusive government (unit 2e). The (attributed content of) the satellite supporting that action is that the majority of the population cannot be pacified (unit 2b), since they have been brutalized (unit 2c).

Example VI
1a) Mr. Obama correctly argued that 1b) in 2011 Mr. Assad "reacted to peaceful protests by escalating repression and killing that 1c) in turn, created the environment for the current strife," 1d) which the Islamic State has been able to exploit. 2a) He said 2b) Mr. Assad and his allies "cannot simply pacify the broad majority of a population 2c) who have been brutalized by chemical weapons and indiscriminate bombing," 2d) and Mr. Obama reiterated 2e) his call for a "managed transition" away from Mr. Assad to a more inclusive government.

```
Span: 1a-1d
[Attribution
  N: [Volitional Result
    N: [Elaboration
      N: 1c
      S: 1d]Elaboration
    S: 1b]Volitional Result
  S: 1a]Attribution
```

```
Span: 2a-2e
[Motivation
  N: [Attribution
    N: 2e
    S: 2d]Attribution
  S: [Attribution
    N: Evidence
      N: 2b
      S: 2c]Evidence
    S: 2a]Attribution]Motivation
```

Figure 9a. Our RST analysis of Obama's argument   **Figure 9b.** RST analysis (continued)

Figure 10. PR Analysis of Obama's argument (Example VI) adapted from [6]

As in Fig. 8, the analysis of the PR argument in [6] (Fig. 10) involves several implicit premises. An argument from value, based upon implicit premises that terrorism is not desirable and that Assad contributes to terrorism, supports the implicit premise of the top-level PR argument that supporting Assad is not desirable. An argument from classification is supported by the claim that Assad's repression created the environment exploited by ISIS (unit 1b-1d) and the implicit premise that that means he contributes to terrorism. Another argument from value supporting the claim that supporting Assad is not desirable is based on the premises that brutalizing the population is not desirable (unit 2d) and that Assad brutalized the population (unit 2c).

Lastly consider Example VII, from a speech by Blair [4, p.86], which we have paraphrased and condensed for the sake of brevity. The speech is analyzed in [4, Fig. 3.1-3.2] as deliberation involving practical reasoning and argument from consequences (Figure 11). Note that the Faircloughs' analysis picks out non-contiguous information to represent various elements, e.g., that the claim can be derived from units 8c, 11, and 12a. In the analyses of PR in [4], the circumstances premise (unit 1-7 in Example VII) describes the context of an agent's decision. Double-headed arrows indicate attacks (units 9 and 10).

Example VII
1-7) the challenge to Britain of change in the modern world … 8a) Three choices: (first) let change overwhelm us, 8b) (second) resist change, 8c) (third) equip to survive and prosper. 9) First choice leads to "fragmented society." 10) Second is "futile." 11) "The only way is to analyze change and meet it." 12a) "Third way" … neither "intervention of old-left" nor "laissez-faire of new right." 12b) "I do not mean" … "soggy compromise." 13) "I mean" there is a role for Government, 14) "but a role for today's world." 15a) "Not picking winners … heavy regulation," 15b) "but about … promoting investment", "helping small business." 16a) "To make Britain more competitive, better at generating wealth," 16b) "but serve needs of whole nation." 17) "a long-term policy."

Our RST analysis is presented in two parts (Figures 12a and 12b). First note that there is no instance of Motivation, since the recommendation to adopt the "third way" is implicit. In the nucleus of the instance of Solutionhood, three actions (unit 8) are offered as potential solutions to a problem, expressed in the satellite (unit 1-7). As shown in Fig. 12a, an Elaboration of the potential solutions is given using two instances of

Antithesis whose nuclei are both unit 11, the favored "third-way" (elaborated by unit 12-16 in one, and by unit 17 in the other). The satellites of the Antithesis instances, representing the disfavored alternatives, are unit 9 and unit 10. Fig. 12b shows a complex structure of Concessions, which do not figure in the argument according to the analysis in [4], but which could be analyzed as rebuttals of potential objections to unit 12a.
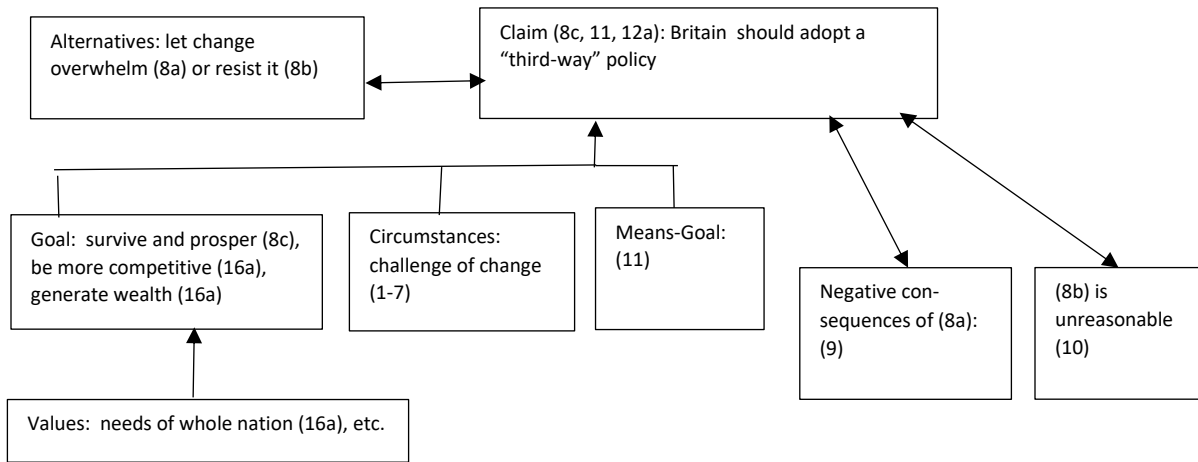

Figure 11: Analysis of Blair's speech (Example VII) adapted from [4]

```
[Span: 1-17
 [Solutionhood:
 N: [Elaboration:
     N: 8
     S: [Antithesis:
         N: [Elaboration:
             N: 11
             S: Span 12-16]Elaboration
         S: 9]Antithesis
     [Antithesis:
         N: [Elaboration:
             N: 11
             S: 17]Elaboration
         S: 10]Antithesis ]Elaboration
 S: 1-7]Solutionhood ]Span
```

Figure 12a. Our RST analysis of Blair's speech.

```
[Span: 12-16
 [Elaboration:
 N: 12a
 S: [Concession:
     N: [Concession:
         N: 14
         S: 13]Concession
     S: 12b]Concession]Elaboration
 [Elaboration:
 N: 12a
 S: [Concession:
     N: 15b
     S: 15a]Concession]Elaboration
 [Elaboration:
 N: 12a
 S: [Concession:
     N: 16b
     S: 16a]Concession]Elaboration]Span
```

Figure 12b. RST analysis (continued)

To sum up some observations about Examples V-VII, first, Solutionhood, not just Motivation, may indicate an instance of practical reasoning. Also, not surprisingly, analyses by argumentation scholars providing a deeper understanding of an argument may require implicit premises. Thus, the mapping from RST to argumentation scheme structure is not straightforward.

4. Related work

Azar [1] noted that RST Motivation can be used to identify practical reasoning. Feng and Hirst [5] attempted to use machine learning to recognize practical reasoning and argument from consequences in a corpus annotated with argumentation schemes. Features used to recognize practical reasoning included words such as 'should', and imperatives and infinitives indicating the speaker's goals. Argument from

consequences was recognized using the count of negative or positive propositions. Cabrio et al. [2] attempted to use manually annotated discourse relations in the Penn Discourse Tree Bank (PDTB) to recognize several argumentation schemes including practical reasoning. The PDTB is a large corpus of naturally occurring text extracted from the Wall Street Journal corpus. Although discourse relations in the PDTB are similar to those of RST, only non-hierarchical relations between adjacent sentences are annotated. Peldszus and Stede [9] studied a corpus of short, elicited arguments ("microtexts") whose RST structure and argumentation structure were manually annotated in terms of claims, supports, and attacks, rather than argumentation schemes. Later the corpus was annotated with a set of argumentation schemes from an alternative descriptive theory of argumentation schemes [8]. RST Motivation was found to overlap with a scheme called Practical Evaluation, somewhat similar to practical reasoning. However, due to the nature of the corpus, it is not clear if the results of research on it will carry over to naturally occurring discourse.

5. Discussion

We have presented concurrent analyses of RST structure and argumentation scheme structure for several examples of PR in naturally occurring monological text as a step towards understanding the relationship between the two models. On the one hand, RST is designed to describe discourse structure for all types of monological text, not just argumentation. On the other hand, since discourse structure determines in part the interpretation of a text, analysis of discourse structure is a necessary component of argumentation analysis. (In fact, for some of the more complicated texts such as Examples III, V, VI, and VII, we found it very helpful to analyze discourse structure in order to understand the arguments.)

We knew of no publicly available, free corpora of naturally occurring monological text annotated with both RST and the argumentation scheme set of [10]. We acknowledge that a limitation of this work is that we did not subject our analyses to validation by others. However, the RST analyses in section 2 are those provided by the creators of RST and our argumentation analyses of those examples are the same sort of straightforward analyses one might find in the argumentation literature. In section 3, we had to rely on our own RST analysis of the complex discourse structure of the examples, although analysis of the argumentation came from argumentation scholars. Thus, it would be worthwhile to have the RST analyses of section 3 verified and refined if necessary by other RST analysts.

Despite these limitations, it is clear that even some very short texts do not have a straightforward mapping between the two models. Since the nucleus of the RST Motivation relation is intended to increase an agent's motivation to act, it is not surprising that the nucleus could be mapped to the conclusion of a scheme such as argument from consequences or means-end practical reasoning. It is when the satellite of Motivation is itself a complex RST structure describing a long span of text that the mapping is unclear without bringing to bear human intelligence. Some interesting phenomena worthy of further study observed in these long spans of text include 1) that the RST Antithesis relation could be used to provide support, as the satellite of an Evidence relation in Figure 3a, and 2) the role of the RST Elaboration relation in argument from cause to effect shown in Figure 6. In mapping from PR to RST, it was shown that the RST relation of Solutionhood, although used in conjunction with Motivation as shown in Example IV, also could occur without Motivation, as shown in Example VII. This is interesting since Solutionhood is not one of the so-called Presentational relations in RST, like Motivation, i.e., relations that are designed to increase an agent's disposition – to act, to increase positive regard, etc. In other words, the reader must infer that the purpose of Blair's speech is to motivate adoption of a certain policy. More generally, the examples of mapping from PR to RST illustrate the challenge of recognizing implicit propositions, which are not part of the RST analysis but which provide key pieces of the argumentation.

While it might be possible for some future argumentation-related applications to exploit RST parsing by restricting the type of text and/or excluding pragmatic inferences from consideration, the strategy does not contribute to a more general computational model of monological argumentation. Such a model must rely on a deeper understanding of text for comprehension and evaluation of argumentation.

6. References

[1] M. Azar. 1999. Argumentative text as rhetorical structure: An application of Rhetorical Structure Theory. *Argumentation*, 13:97-114.

[2] E. Cabrio, S. Tonelli, and S. Villata. 2013. From discourse analysis to argumentation schemes and back: Relations and Differences. *CLIMA XIV, LNAI 8143*, pp. 1-17.

[3] L. Carlson and D. Marcu. Discourse Tagging Reference Manual. ISI Tech Report ISI-TR-545. July 2001. Available from https://www.isi.edu/~marcu/discourse/tagging-ref-manual.pdf

[4] I. Fairclough and N. Fairclough. *Political Discourse Analysis*. London: Routledge; 2012.

[5] V.W. Feng and G. Hirst. 2012. Classifying arguments by scheme. *Proc. of ACL 2012*, pp. 987-986.

[6] F. Macagno and D. Walton. Practical Reasoning Arguments: A Modular Approach. *Argumentation*. Published on-line 2018.

[7] W. Mann and S.A. Thompson.1988. Rhetorical structure theory: Towards a functional theory of text organization. *TEXT*, 8:243-281.

[8] E. Musi, T. Alhindi, M. Stede, L. Kriese, S. Muresan, and A. Rocci. 2018. A Multi-layer Annotated Corpus of Argumentative Text: From Argument Schemes to Discourse Relations. *Proc. of LREC 2018*, pp. 1629-1636.

[9] A. Peldszus and M. Stede. 2016. Rhetorical structure and argumentation structure in monologue text. *Proc. 3rd Workshop on Argument Mining*, pp. 103-112.

[10] D. Walton, C. Reed, and F. Macagno. 2008. *Argumentation Schemes*. Cambridge University Press, Cambridge.