

Argumentation Mark-Up: A Proposal

Jean-François Delannoy

RES International and University of Ottawa, Ottawa, Canada

Abstract

This is a proposal for an XML mark-up of argumentation. The annotation can be used to help the reader (e.g. by means of selective highlighting or diagramming), and for further processing (summarization, critique, use in information retrieval). The article proposes a set of markers derived from manual corpus annotation, exemplifies their use, describes a way to assign them using surface cues and limited syntax for scoping, and suggests further directions, including an acquisition tool, the application of machine learning, and a collaborative DTD definition task.

1. Introduction

Computational linguistics has had a long interest in discourse representation, but generally on the structure of monologue or dialogue rather than on content analysis, rhetoric, or argumentation proper. There is an increasing amount of work on mark-up, that is, indicating locally in the text the linguistic information – rather than in some knowledge-representation formalism. Mark-up can be designed for the reader, for a browser (in charge of displaying the information according to some template), or for further processing (a summarizer, a semantic analyzer, a reasoning system) – or a combination of these.

1.1. Reading aids

Active reading involves a task of text mapping, selecting, anchoring and short-term memorization, all the more taxing when reading a scarcely-formatted text. Speed reading techniques (Judson & Schail 73) address in fact not only speed per se, but also efficient information extraction and critiquing. (Note: I am much in favour of giving speed reading more recognition -- and I even practice it live in a live radio program on literature, to quickly select passages.). More people have to read more text, and often this cannot be done in integral reading mode (cf. the idea, in Carver 90, of “gear shifts” between six reading modes). Highlighting helps reading, as seen in common experience (also see numerous references in Ostler 98). With a rich and appropriate annotation, the reader has a better idea of what is important in some given respect, and retention is better. Then, it may well be useful to 1) develop a powerful reader-oriented annotation system, and 2) implement automatic highlighting or interactive assisted annotation.

Those heavy readers can be helped more appropriately by summaries, highlighting, hypertext, etc. All try to facilitate access and use, by helping selective perception and interpretation. One should allow at least multiple views of a text. There is a qualitative difference of the finesse of understanding if one can manipulate text, or

access essential information (Cremmins 82, Jewinsky 90), possibly an order of magnitude faster. Those points were addressed in a May 1999 colloquium organized by this author (Delannoy 99).

1.2. Processing, modularity, and interchange

Corpus annotation has largely addressed text structure and categorial tagging, but until very recently has been leaving out most linguistic annotation: lexical (word-sense disambiguation), syntactic, sentence semantic, passage semantics. A mark-up standard would facilitate modular processing and interchange among teams working on argumentation.

1.3 Other work on argumentation

There does not seem to be focused work on argumentation annotation, as distinguished from dialogue structures.

Moulin 95 uses speech acts, but does not discuss argumentation structure and validity.

The Global Document Annotation initiative (GDA), a small-team Japanese-German effort to develop a wide set of tags; it treats argumentation marginally, with half a dozen causality relations: cause, reason, motivation, purpose, concession, contrast.... This is rather similar, in fact, to Fillmore-inspired verbal cases, as those used in the clause-level analysis part of Barker et al. 98b.

The Text Encoding Initiative (TEI) will soon be broadening its scope, so far mostly concerned with text structure, but has not circulated concrete proposals yet on discourse.

The encoding schemes DRI and Mate do not consider the question.

2. Argumentation analysis

I focus on argumentation, which is, in a way, the articulation of discourse and content analyses. Argumentation analysis is particularly represented in critical reading (of news, editorials, political communiqués, other people's analyses on politics or economics, and legal interpretation).

Argumentation is often not to be treated in a narrow predicate-logic framework. It is better account by Toulmin et al. 84 (using a combination of warrants and evidence to reach a conclusion) rather than, for example, Groarke et al. 97 (with classical predicate logic, and treating induction as a marginal case). In fact, a lot of everyday argumentation is based on induction from models left implicit, rather than deduction from clearly shared models. One tag, <FRAMEOFREF> addresses analogical or newly created

models used in a belief/construction.

In sum, the purpose of a semi-automatic tracking and analysis of argumentation includes the following:

- synthesizing claims
- clarifying claims in association with the relevant evidence and warrants
- listing the actors' position on an issue (pro, contra)
- pinpointing terminological conflicts
- visualizing underlying models of the domain
- singling out non-demonstrative rhetorical effects
- coherence checking
- comparing alternatives (some argument can be shown to be better than others, in absolute or for a given knowledge base)
- a critique of argumentative rhetorical devices, including fallacies.

3. The current tag set

3.1. Introduction

The current system of tags is inspired by RST and works on reasoning like Toulmin et al. 84 or Walton 96, and from manual experiment.

The four classes of tags are:

1. Reasoning and rhetoric
2. Modelling: description of the world; actors
3. Textual and narrative
4. Evaluative

Classes 1, 2 and 4 are the most characteristic of our focus on argument; class 3 serves to accommodate text flow, inasmuch as it is pertinent to the development of an argument.

Class 4 tags are assigned by the user, or, in part, by a semantic analyzer + reasoning system if available.

Remarks:

- <ID> and <REF> can be added to any tag to handle inter-segment reference.
- <ACTOR> is used to tag an entity, and so plays a directly semantic role, besides its interplay in the discourse analysis.
- Text type: political analysis. Description, evaluation, and scenario.

3.2. The tag set

TYPE	TAG	ELEMENTS	DESCRIPTION
I. REASONING AND RHETORIC			
Reasoning and argumentation	<ASSN>		assertion
	<JUSTIF>	type={fact, goal, analogy, declaration}	justification
	<EVID>		evidence
	<BACKGROUND>		background
	<CONCESSION>		concession
	<CONTRAST>		contrast
	<EX>	reality: {present, past, virtual,	example

TYPE	TAG	ELEMENTS	DESCRIPTION
		projected}	
	<C-EX> <HYP> <REL> <CONS>		counter-example hypothesis related to enounce consequences (of state of affairs)
	<CONDITION> <ATT-CONS> <CONTRA_JUST> <PRO> <CONTRA> <ANN-ASSN> <WHATIF> <METAPHOR> <INTERP>		premiss or condition attitude as a natural consequence justification for opposition position-pro, position-contra contradict-without-justification announce assertion thought experiment metaphor interpretation of a state of affairs, a stance, or a declaration reasoning technique
Rhetorical	<REAS_TECHNIQUE> <TROPE> <RHETQUES> <FOCUS>	type = {modusPonens, modusTollens, induction ...}	tropes as commonplaces (mere) rhetorical question use of focus (e.g. importance of an element in the reasoning)
Tone	<POL>	tone = {ironic, derisive, afflicted, aggressive}	varieties of polemic tone
2. MODELLING			
Description of a state of affairs	<FRAME_OF_REF>	ref={ nature, etc.}	model (description of one's view of a state of affairs); its frame of reference
	<SITUATION>	mod={certain,likely,unlikely,impossible}	description of the current situation
	<BACKGROUND> <SCENARIO>	mod={certain,likely,unlikely,impossible}	background on the situation hypothesis on the future
Actors and assertions; polemical stance	<ALTERNATIVE> <RECOM> <ACTOR>	name, title	alternative recommendation an actor: a person or institution saying or doing something
	<OPP>	expose = { lie, inconsequence} strategy = {counter-facts, bad-consequences, bad-outweighs-good, untenable-principles, badPrecedents}	opposition
3. TEXTUAL AND NARRATIVE			
Text function	<INTRO> <DEVT> <REPHRASE> <CONCL> <SUMMARY> <QUOTE> <REF> <LINK> <COMMENT> <EVENT>		introduction development rephrasing conclusion summary point quoting an actor reference (hyper)link author's comment event with actor, time, type etc.
Narrative structure	<LATER_EVENT>		later or subsequent event
Speech acts, actor interaction	<QES> <ANSW> <REQUEST>	BY (element allowed in any tag) adeq = {adequate, beside the point}	author of an utterance, believer of an opinion question answer requesting information

TYPE	TAG	ELEMENTS	DESCRIPTION
	<GIVE-INFO> <REBUTTAL>		supplying information rebuttal of an actor's point by another actor
	<APOLOGY> <FLATTERY> <SUGGESTION>		apology flattery
Reference tags	<ID> <REF>	to = <i>ID of referent</i>	ref. "de dicto": to another, quotable, segment ref. "de re": to content of another segment
Other	<REFDERE> <SOURCE>	to = <i>ID of referent</i>	source of an information or argument: a book, etc.
4. EVALUATIVE			
Logical evaluation, including fallacies	<GOOD ARG> <FALLACY>	type = {beggingTheQuestion, redHerring, ignoratioElenchi, simplisticModel, strawMan, AdMajoritatem, adHominem, overGeneralization, etc.}	good (formally, or plausibly valid) argument fallacy
	<CONTRAD> <CONTRAD_EXT> <COMMONPLACE>		self-contradiction contradiction/opposition with another source commonplace, logically valid or not
Reader's position and comments	<AGREE> <DISAG> <SEARCH_FOR_EVID> > <KW> <REM>		pro contra should search for evidence. For the user's own use. key word or key expression reader's comment

4. Examples

4.1. Example: "Chavez rules", *The Economist*, May 1st, 1999, p 34

This excerpt is the evaluation part of the article, between the biography and a bibliography.

Text type: political analysis. Description, evaluation, and scenario.

Original text

If they ever doubted it, Venezuela's political elite now know who's boss: President Hugo Chavez. He promised during his election campaign to end their hold on power. He has now taken two giant steps toward doing so – and replacing it with his own. First, the president cowed Congress into granting him nearly all the powers that he had demanded to enact economic and financial legislation by decree. Then, on April 24th, a referendum gave him a huge majority for the creation of a new assembly to rewrite the constitution.

The former paratroop colonel, dismissed in the early days of his challenge for power as a political neophyte, has now put the sophisticates rudely in their place. He has also shown up the weakness of the two big traditional parties. Crushed in the presidential election, they are still groping for a strategy to counter Mr Chavez and his alleged dictatorial tendencies, and who no sign so far of finding one.

...

Still more so [i.e. a victory], in its likely effects, was the backing Mr Chavez won for the creation of a new constituent assembly. The turnout, admittedly, was only 39%. But, of those who did bother to vote, over 90% backed his proposal. The

country's 1961 constitution, he claims, has only perpetuated the rule of the elite in a sham democracy. The new assembly is to be elected – on non-party lines – in late June, and is meant to have a constitution ready by early January for approval by referendum later that month.

The assembly will no doubt shake up the structures of government – not least, probably, in allowing a president the two consecutive terms that Mr Chavez seeks. Whether he can earn and win re-election it is far too early to say. But, for now, bar some seriously bad luck or bad bungling, he is firmly in the saddle, and strongly popular.

...

Annotated text

<SITUATION>If they ever doubted it, Venezuela's political elite now know who's boss: President <ACTOR NAME=Chavez ID=1>Hugo Chavez. </ACTOR>

He promised during his election campaign to end their hold on power.

He has now taken two giant steps toward doing so – and replacing it with his own.

<DETAILS>First, the president cowed Congress into granting him nearly all the powers that he had demanded to enact economic and financial legislation by decree. <LATER_EVENT> Then, on April 24th, a <KW>referendum</KW> gave him a huge majority for the creation of a new assembly to rewrite the constitution.

</DETAILS>

</SITUATION>

<ACTOR REF=Chavez TITLE=former_paratroop_colonel>The former paratroop colonel, </ACTOR>

<CONTRAST BY=unspecified DOMAIN=opinion_on_abilities>dismissed in the early days of his challenge for power as a political neophyte, </CONTRAST>

has now put the sophisticates rudely in their place.

He has also shown up the weakness of the <ACTOR ID 1> two big traditional parties.

<CAUSE> Crushed in the presidential election, </CAUSE>

<REF = "the two big traditional parties"> they are still groping for a strategy to counter Mr Chavez and his alleged dictatorial tendencies, and who show no sign so far of finding one.

...

<INTERP> Still more so [i.e. a victory], in its likely effects, was the backing Mr Chavez won for the creation of a new constituent assembly.

<EVID> <CONCESSION> The turnout, admittedly, was only 39%. </CONCESSION>

<But, of those who did bother to vote, over 90% backed his proposal.</EVID>

<DECLA BY=Chavez>The country's 1961 constitution, he claims, has only perpetuated the rule of the elite in a sham democracy. </DECLA>

<SCENARIO> The new assembly is to be elected – on non-party lines – in late June, and is meant to have a constitution ready by early January for approval by referendum later that month.

</SCENARIO>

< SCENARIO >

The assembly will no doubt shake up the structures of government – not least, probably, in allowing a president the two consecutive terms that Mr Chavez seeks. Whether he can earn and win re-election it is far too early to say.

</SCENARIO>

<SITUATION>But, for now, <CONDITION MOD =unlikely>bar some seriously bad luck or bad bungling </CONDITION>, he is firmly in the saddle, and strongly popular. </SITUATION>

4.2. Example 2: Encyclopaedia Britannica on Herbert Marcuse

Text type: encyclopedic (with ironic distance)

Original text

A Hegelian-Freudian-Marxist, Marcuse was wedded to the ideas of radicalization, vociferous dissent, and "resistance to the point of subversion." He believed that Western society was unfree and repressive, that its technology had bought the complacency of the masses with material goods, and that it had kept them intellectually and spiritually captive. However, although a frank exponent of resistance to the established order, Marcuse did not applaud the campus demonstrations. "I still consider the American University an oasis of free speech and real critical thinking in the society," he said. "Any student movement should try to protect this citadel... [but] try to radicalize the departments inside the university."

Annotated text

A <POL tone=irony> Hegelian-Freudian-Marxist</POL>, <ACTOR NAME=Marcuse>Marcuse was </ACTOR> <POL tone=irony>wedded to the ideas </POL> of radicalization, <POL TONE =irony>vociferous</POL> dissent, and <QUO type=Excerpt> author=Marcuse> "resistance to the point of subversion."</QUO>

He <POL TONE =irony>believed</POL> that Western society was unfree and repressive, that its technology had bought the <POL TONE=irony>complacency</POL> of the masses with material goods, and that it had kept them intellectually and spiritually captive.

<CONTRAST>However,

<CONCESSION> although a frank exponent of resistance to the established order

</CONCESSION>,

Marcuse did not applaud the campus demonstrations.

<EVIDENCE>

<QUOTE BY=Marcuse>"I still consider the American University an oasis of free speech and real critical thinking in the society," he said.

<RECOM>"Any student movement should try to protect this citadel [but] try to radicalize the departments inside the university ."

</RECOM>

</QUOTE>

</EVIDENCE>

</CONTRAST>

5. Processing

5.1. Method

The annotator is to be associated to a *summarizer* (Delannoy et al. 1998). The summarizer is a non-knowledge-based selector of passages which combines indices of different aspects: keywords assigned dynamically, position, word distribution, coherence via lexical chains (using WordNet or Roget: Barker et al. 98a) and markers, and thesaurus relations. The initial granularity is that of sentences, although we are trying to refine it with a grammar. In the compilation of the final summary, sentences are selected one by one, with a bias to sentences containing keywords underrepresented so far. As a partly implemented feature, the input is classified in one of various text types (neutral, news story, political analysis, narrative, etc.), and the user selects one of several output types (events, changes, utterances without treatment, or details of argumentation)

The processing for argumentation mark-up (in progress)

uses a chart parser for segmenting, rather than the shallow segmenting in Marcu 97. It targets more than "clause-like" units: non-clause circumstantials (adverbials or adjectivals) are recognized and kept separate. This is to allow for summarization by elimination of minor constituents ("text reduction": Greffenstette 98), and also for the treatment of circumstantials in narrow/broad scope as required (as in: "villagers, who holds guns, will be considered outlaws" vs. "villagers who hold guns will be considered outlaws").

Non-binary branching (3 and more) is allowed, as are cross-level relations, e.g. between a clause and a whole paragraph, in particular for cases of propositional reference ("Those points will be discussed etc."), or meta-textual reference ("the concept outlined in the previous paragraph is now applied to etc."), that is, *de dicto* as opposed to *de re*.

The set of cues is inspired by the extensive list in Marcu 97. There are rules of *scoping* for the cues into relations and their scope over text segments. The construction of the tree of rhetorical relations is done by applying rules.

The user can intervene in the process to rectify a decision of the system, or to insert free-style comments or links.

5.2. Output

The output can be:

- the input text, enriched with marked up of argumentative structure in the discourse XML (if desired, highlighted via a browser)
- a graph of the argumentation components (e.g. for a critical thinking class)
- a point-form summary of claims made by the author and, if applicable, of the actors reported on
- a highlight of fallacies: bad arguments (with flaws of evidence, relevance, cohesion, etc.)
- answers to standard questions in general or on the type of text, as: timeline, list of persons and charges mentioned, declarations, predictions, etc.
- a chart of the positions of various actors pro and contra the main points at issue – and of their oppositions (e.g. on an article of political analysis).

At the time of writing, this is not operational. As intended, the selection of the output type is done by an HTML interface launching a CGI which parses the XML and translates it to HTML, selectively to reflect the choice of viewing made by the user.

6. Discussion

6.1. Suitability and scope

- In our manual experiments, XML-style annotation appears to cover all argument structures, in terms of adequacy and non-ambiguity. Still, the criteria of multiple-user satisfaction, and of the fulfilment of a further task, should be examined in the future.
- the XML representation framework is versatile in matters of extensibility, scoping, and embedding; still, one will have to test it for possible overlap problems
- the annotation scheme is inherently multilingual; the annotation process requires language-specific lexical and syntactic resources
- the mark-up addresses argumentative texts: those reporting collaborative or contradictory discussants (in direct speech, indirect speech, or synthetic rephrasing), those where the author gives claims and rationales, and those texts meeting both criteria. More finely, it may be useful to characterize different subtypes of texts: a reader does not look for the same information in different types of texts; and not with the same cues. This has not been considered as yet.

6.2. Assumptions, risks, limitations

There is a risk of running into problems of **overlap**:
To address this, we have to :

- use the tag classification
- handle specific priorities where applicable
- for the rest, use one the existing means for handling overlap, e.g. as proposed for the Bergen Wittgenstein Archive (Sperberg-McQueen & Huitfeldt 98), or by the scoping methods of GDA.

7. Background and Advancement

We had the idea of HTML-style mark-up of discourse in early 1998, before we were even acquainted with XML. The original purpose was mostly one of highlighting, for applying critical-thinking analyses in a standardizable way.

Experiments have been done manually by the author on 42 texts, 10 to 600 words long, consisting of news articles (Le Monde, CNN Online), encyclopedia entries (E. Britannica online) and on texts containing more in-depth analyses (The Economist; editorials in Le Monde; articles of Le Monde Diplomatique and the New York Review Of Books).

The analyzer is being prototyped in Perl to be associated to the **summarizer** in (Delannoy et al. 98). It includes an operational parser of XML, and a chart-parser of English, in progress.

The system of tags can probably be improved by more manual mark-up and evaluation. The DTD is not yet mature; it should be refined and validated on a large number of texts, and preferably in a collaborative way..

8. Conclusion

This proposal is, to our knowledge, the first to explicitly apply XML mark-up to *argumentation* mark-up. It claims that the mark-up can be useful both for human critiquer and for further processing, thus being a multi-purpose, intermediate-level representation.

Future work includes:

- tracking possible *conflicts of scope* between tags (overlap, vs. simple embedding)
- a *systematic evaluation of the tag set*, its adjustment, and the definition of a *DTD*
- completing the implementation
- application of machine learning (cf. the AAAI-97 Spring Symposium on ML for Discourse analysis; Hirschman et al. 98; Barker & Szpakowicz 98).
- implementing an *acquisition tool* with which a user could simply highlight a passage and click the appropriate tag's button.
- exploration of *information extraction* based on a combination of HTML tags, (for structure) and discourse XML; comparison with the automatic mark-up of online catalogs
- test with the students class on *critical thinking*

- testing on *polylogal* discourse
- designing a *critiquing* software, and especially a recognizer of fallacies
- gather more data on speed *reading* or plain text, and on reading/speed reading of annotated text
- last but not least, engaging in a *collaborative effort towards a common DTD* for argumentation mark-up, which is an important part of discourse mark-up.

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