CLIMA XIV

Mind the Gap: Abstract vs. Applied Argumentation

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MIND THE GAP

Which side are you on?

- One side is:
  - » Solid
  - » Safe
  - » Static
- The other side is
  - » Groundless
  - » Dangerous
  - » Dynamic

Which side are you on?

- Abstract is:
  - » Solid — **Grounded on principled foundations and formal properties**
  - » Safe — **Cautious advancements (and it is easier to get published?)**
  - » Static — **Formal theories are like buildings, designed to last "forever"**

Which side are you on?

- Applied is
  - » Groundless — **Applications are often driven by domain specific, if not ad hoc, considerations**
  - » Dangerous — **Risk of wasting a lot of effort (and getting criticisms from both sides)**
  - » Dynamic — **Application needs (and opportunities) change as the world change**


Applied
MIND THE GAP
Abstract

Which side are you on?

- Applied is:
  - » Solid — **It addresses real needs of real people in the real world**
  - » Safe — **Effort oriented to concrete goals (it is easier to get money?)**
  - » Static — **Real applications are there and always will be there**

Which side are you on?

- Abstract is
  - » Groundless — **Theory for the sake of theory**
  - » Dangerous — **Risk of wasting a lot of effort (useless/unread papers, no money)**
  - » Dynamic — **Waves of fashion are not unusual in abstract research**


Abstract
MIND THE GAP
Applied

No matter which side you prefer …

Crossing the line (in both directions) is not easy but it's the only way to REALLY GO SOMEWHERE

Presentation goals

- Analyzing gaps (of various kinds) and looking for bridges
- Mainly taking examples from (abstract and applied) argumentation literature
- … and from (abstract and applied) implemented argumentation tools

What is abstract?

- Abstract argumentation “is” Dung’s framework, where “everything” but the (binary) relation of attack between arguments is abstracted away
- Many variations and extensions of Dung’s framework are available in the literature
- The recent Abstract Dialectical Framework formalism surpasses Dung’s framework in terms of abstraction

Dung's framework

Definition 2. An *argumentation framework* is a pair

$$AF = \langle AR, attacks \rangle$$

where AR is a set of arguments, and *attacks* is a binary relation on AR, i.e. $attacks \subseteq AR \times AR$.

- A directed graph (called *defeat graph*) where:
  - » arcs are interpreted as attacks
  - » nodes are called arguments "by chance" (let say historical reasons)

Here, an argument is an abstract entity
whose role is solely determined by its relations to other arguments. No special attention is paid to the internal structure of the arguments.

Even more abstract: abstract dialectical frameworks

Definition 5. An *abstract dialectical framework* is a tuple $D = (S, L, C)$ where

- S is a set of statements,
- $L \subseteq S \times S$ is a set of links,
- $C = \{C_s\}_{s \in S}$ is a set of total functions $C_s : 2^{par(s)} \rightarrow \{in, out\}$, one for each statement s. C_s is called acceptance condition of s.

- Even the nature of the relation between "arguments" is not specified: links of different nature (attack, support, others? …) all belong to the relation L
- All the meaning is embedded into the acceptance conditions (one for each node: heterogeneous situations may occur)

What is abstract?

- Identifying “abstract argumentation” with Dung’s framework (and its variations/derivations) can be regarded as a misconception
- Abstract arguments are not arguments (or better, need not to be arguments in the usual sense)
- Dung’s framework is not specifically about argumentation, it is about managing general conflicts (of a certain kind)
- Dung’s framework provides a powerful abstraction concerning only one “phase” of the argumentation process

He who laughs last laughs best?

Definitional view:

- Underlying language
- What an argument is
- Conflict between arguments
- Defeat between arguments
- Status of an argument

Procedural view

- Knowledge base
- Argument construction
- Conflict/defeat identification
- Argument status evaluation
- Conclusions status evaluation

- The fact that is “comes last” does not mean that it is the “highest” abstraction
- Bias towards the (very important) notion of conflict (due to a bias towards a “logical view”?)

Abstracting a bit

Definitional view:

- Underlying language
- What an argument is
- **Relations** between arguments
- Status of an argument

Procedural view

- Knowledge base
- Argument construction
- **Relation** identification
- Argument status evaluation
- Conclusions status evaluation

- Conflict is one of the relations (the most important? the only one always present?)
- Dung's framework still may play a key role, but …
- in connection with other "parallel" abstractions

What is abstract?

- Formalisms involving the “real” construction of arguments (using logic, rules, assumptions) are often called “instantiated argumentation”
- … but they are probably still rather “abstract” to an outsider’s view
- In fact, one of these formalisms was presented in a paper entitled “Abstract argumentation systems” (Vreeswijk 97)

What is abstract?

In this paper, a *deductive system* is a pair $(\mathcal{L}, \mathcal{R})$ where

- $\mathcal{L}$ is a formal language consisting of countably many sentences, and
- $\mathcal{R}$ is a set of inference rules of the form

$$\frac{\alpha_1, \ldots, \alpha_n}{\alpha}$$

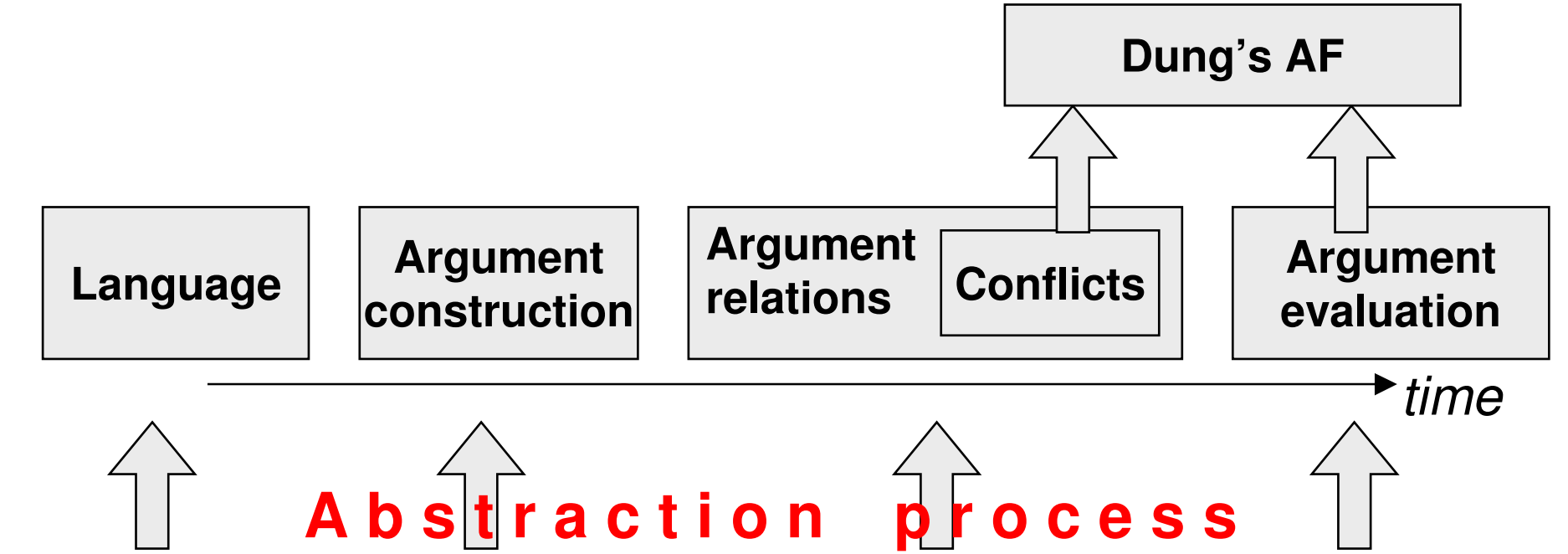
where $\alpha, \alpha_1, \ldots, \alpha_n \in \mathcal{L}$ and $n \geqslant 0$.

Definition 2.1. Given a deductive system $(\mathcal{L}, \mathcal{R})$, an *assumption-based framework* with respect to $(\mathcal{L}, \mathcal{R})$ is a tuple $\langle T, Ab, \bar{\ } \rangle$, where

- $T, Ab \subseteq \mathcal{L}$ and $Ab \neq \emptyset$,
- $\bar{\ }$ is a mapping from Ab into $\mathcal{L}$, where $\overline{\alpha}$ denotes the *contrary* of α.

The theory T expresses a given set of beliefs, and Ab is a set of assumptions that can be used to extend T.

Minding the steps …

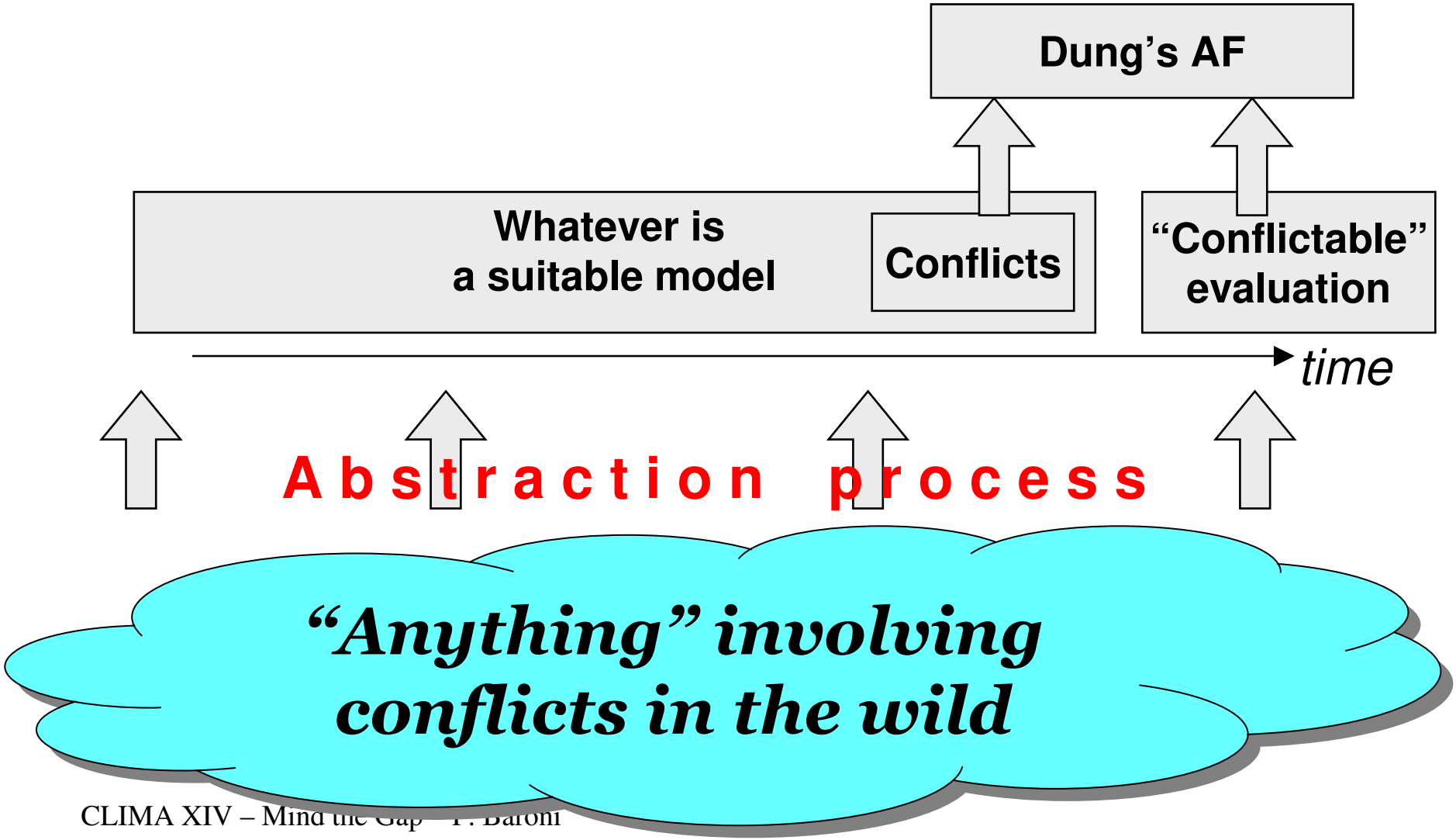


An argumentation species in the wild

What is abstract?

- We have different steps of abstraction, hence multiple gaps (not just one)
- Crossing multiple gaps with one big jump is more difficult (and more “dangerous”) than dealing with them step by step
- In particular I see as particularly dangerous (and error-prone) a single jump from a natural language description to Dung’s framework
- . . . though it is really so convenient when one has to include “realistic” examples in “abstract” papers

Dung's AF: more and less



A logical bias?

- Many “instantiated argumentation” formalisms (ABA, DeLP, ASPIC+, …) assume an underlying logic and the derivation of arguments using some “inference rules”
- The emphasis on conflict might be related to the fact that, from a logical point of view, arguments *per se* are nothing really new, while having to cope with conflicts is
- Argument derivation is taken for granted and does not involve special relations between arguments

A logical bias?

- Argument construction is separated from argument evaluation (conflict management)
- “No reasoning” about the existence of conflicts
- Attacks come from other constructed arguments and are somehow related to the premises-rule-conclusion underlying structure
- Conflicts are binary
- Conflicts are all the same (at least in the evaluation)
- One or many (equally justified) attackers is the same
- Argument evaluation is rather crisp

Unbiasing

- Are there less biased (or differently biased) abstractions?
- Yes, both concerning argument structure and argument relations
- Less, as to my knowledge, on argument evaluation

Argumentation schemes

- Semi-formal model where arguments are instances of schemes, namely prototypical patterns of defeasible derivation of a conclusion from some premises
- A scheme is equipped with a set of critical questions, each stressing a specific aspect of the scheme (a sort of checklist)
- Direct relations with common-sense examples
- Sixty primary schemes (many with subschemes) in the Walton-Reed-Macagno 2008 book

Argumentation schemes

2. ARGUMENT FROM EXPERT OPINION

Major Premise: Source *E* is an expert in subject domain *S* containing proposition *A*.
Minor Premise: *E* asserts that proposition *A* is true (false).
Conclusion: *A* is true (false).

Critical Questions

CQ1: *Expertise Question*: How credible is *E* as an expert source?
CQ2: *Field Question*: Is *E* an expert in the field that *A* is in?
CQ3: *Opinion Question*: What did *E* assert that implies *A*?
CQ4: *Trustworthiness Question*: Is *E* personally reliable as a source?
CQ5: *Consistency Question*: Is *A* consistent with what other experts assert?
CQ6: *Backup Evidence Question*: Is *E*'s assertion based on evidence?

Argumentation schemes

3. ARGUMENT FROM WITNESS TESTIMONY

Position to Know Premise: Witness *W* is in a position to know whether *A* is true or not.
Truth Telling Premise: Witness *W* is telling the truth (as *W* knows it).
Statement Premise: Witness *W* states that *A* is true (false).
Conclusion: *A* may be plausibly taken to be true (false).

Critical Questions

CQ1: Is what the witness said internally consistent?
CQ2: Is what the witness said consistent with the known facts of the case (based on evidence apart from what the witness testified to)?
CQ3: Is what the witness said consistent with what other witnesses have (independently) testified to?
CQ4: Is there some kind of bias that can be attributed to the account given by the witness?
CQ5: How plausible is the statement *A* asserted by the witness?

Argumentation schemes

- Can be regarded as a sort of defeasible rule, but ...
- Is filling a scheme an inferential process?
- Just posing a critical question may affect an argument
- You don’t need to construct another argument to affect/attack an already existing one
- The idea of a non-just-logical prototypical and defeasible scheme is applicable also to other parts of the argumentation process

Argumentation schemes

- A chapter of the book is entitled “Attack, Rebuttal and Refutation”
- Detailed analysis and discussion of different types of conflicts
- More questions than answers
- Leaves you wondering whether all conflicts are (to be treated) the same
- Do we need “attack schemes”? (and/or other kinds of schemes?)

IBIS

- “The concept of these Issue-Based Information Systems (IBIS) rests on a model of problem solving by cooperatives as an argumentative process”
- Essentially, the dispute concerning alternative positions to address an issue is carried out by constructing “arguments in defense of or against the different positions”
- Bipolar model

IBIS nodes

Issue: a question in need of answer

Answer: many are available

Pro-argument: supports a given answer or another argument

Con-argument: objects to a given answer or to another argument

Minding the meaning

		
Defense	Attack	already in AF's
Support	Attack	At least 4 different inference-related notions of support in the literature
Pro	Con	Can they be treated as an inference-related notion?

Argument Interchange Format

- Actually, much more than a “format”
- An ontology
- Some composition rules for argument graphs
- A rich conceptual model
- A very expressive formalism

Argument Interchange Format

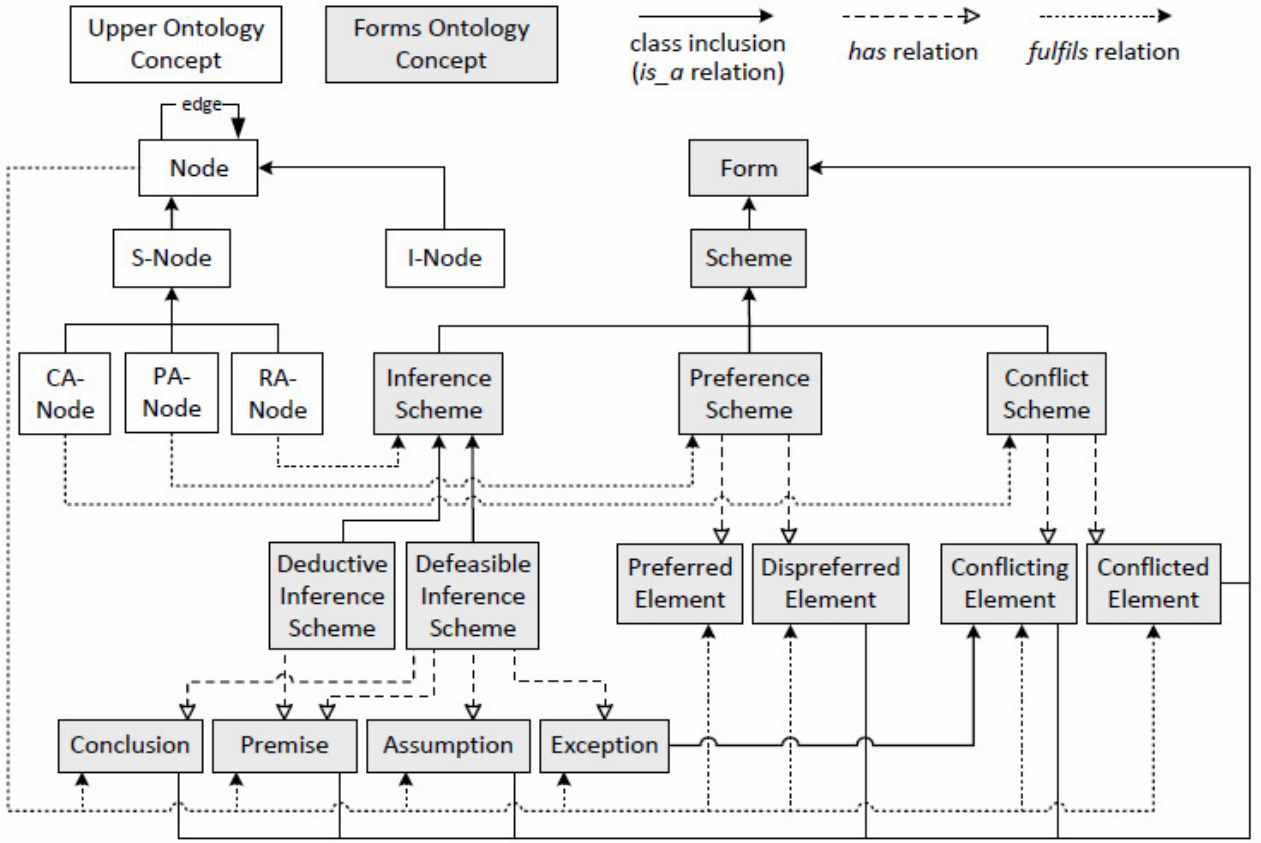


Figure 2: The AIF specification

Argument Interchange Format

Definition 1.1 [AIF graph]
An *AIF argument graph* G is a simple digraph (V, E) where

1. $V = I \cup RA \cup CA \cup PA$ is the set of nodes in G, where I are the I-nodes, RA are the RA-nodes, CA are the CA-nodes and PA are the PA-nodes; and
2. $E \subseteq V \times V \setminus I \times I$ is the set of the edges in G; and
3. if $v \in V \setminus I$ then v has at least one direct predecessor and one direct successor; and
4. if $v \in RA$ then v has at least one direct predecessor that fulfils the form *premise* and exactly one direct successor that fulfils the form *conclusion*; and
5. if $v \in PA$ then v has exactly one direct predecessor v_i that fulfils the form *preferred element* and exactly one direct successor v_j that fulfils the form *dispreferred element*, where $v_i \neq v_j$; and
6. if $v \in CA$ then v has exactly one direct predecessor that fulfils the form *conflicting element* and exactly one direct successor that fulfils the form *conflicted element*.

Argument Interchange Format

- Information (I-nodes) and Scheme nodes (S-nodes)
- Schemes for inference, conflict, and preference
- Any connection between I-nodes is an S-node
- S-nodes can be connected arbitrarily by S-nodes
- You may represent a preference between two preferences, a conflict between two inferences, a conflict between two conflicts, ...
- Very expressive and very abstract formalism
- Suitable for meta-argumentation and more …

Gaps (and bridges) between abstractions

- AF is a special case of AIF graph, but an AIF graph may need an evaluation mechanism
- Dung's AF variations may found counterparts and/or motivations in the AIF model
- AIF vs ADF

Gaps (and bridges) between abstractions

- A TAFA-11 paper considers the notion of “probabilistic” arguments and attacks (which may potentially appear in the framework)
- Critical questions of argument schemes seem to provide a reasonable motivation for this kind of notion
- And the proposed formal setting may be useful in a scheme-based argumentation context
- ... but argument schemes are not cited in that paper

Gaps (and bridges) between abstractions

- In bipolar argumentation frameworks both attack and support are regarded as fundamental abstract relations for argument evaluation
- Looks really like the IBIS model, but, at least in the early papers, it is not cited as a motivation or for comparison

What is applied?

- Something addressing a “real problem”
  - » Toy problems
  - » Toy instances of real problems
  - » Problems “invented” by the researchers themselves
  - » Proof-of-concept (possibly only paper-based)
- Something running
  - » Implementation of a useless theory and/or a toy problem
  - » User community (developers, occasional users, selected “real users”, large set of real users)
  - » Actual usage (test, experimental, daily activities)

What is applied?

- We have different levels of “application”, hence multiple gaps (not just one)
- Some running systems might be “less applied” than some papers
- Toys play a crucial role in learning processes (not only in childhood)
- Serious application-oriented works require specific additional efforts (involvement of experts and users, implementation) which deserve respect

What is argumentation?

- Argumentation is a multi-faceted word, with a variety of informal/intuitive and also formal meanings
- Monological argumentation (reasoning oriented)
- Dialectical argumentation (involving multiple parties)
- Especially in dialogues different goals are possible
- Abstraction detaches the word “argumentation” from some/most/all of its meanings and properties, keeping only those required by the intended abstraction goal (and possibly adding other ones)

A mindful journey

- Looking for applications in “abstract” papers
- Looking for abstractions in applications
- Exhaustiveness is impossible (and possibly undesirable)
- Useful insights are possible

Motivating applications in abstract papers

- Appeal to others' applicability:
  From formalism to formalism

- Appeal to common sense:
  Natural language examples

- No appeal (or fact appeal):
  Real problems in specific application domains

Dung's framework

In the next two subsections, we will demonstrate the "correctness" of our theory of argumentation through two examples in which we show how our theory can be used to investigate the logical structure of the solutions to many practical problems.

- n-person games
- Stable marriage problem

- Non monotonic reasoning and logic programming as argumentation
- Argumentation as logic programming

Dung's framework

- Relationships with other abstract/general formalisms which are "closer" to applications
- Ideas from the abstract framework can shed new light on some aspects of the application contexts
- Example: Preferred semantics vs. Stable semantics
  - » Solutions wh… …n-persons games
  - » Traditi… …le Marriage Problem wit…
- Covers the "last mile" of the gap (in a very useful and interesting way) but …

Is this argumentation?

Assumption-Based Argumentation (Bondarenko et al., AIJ 1997)

- The assumption-based argumentation (ABA) “is an instance of AA”
- Arguments are deductions supported by assumptions
- Attacks are deductions of the contrary of an assumption
- ABA is shown to capture as special cases several (in turn less abstract) nonmonotonic logics
- In a vein similar to Dung’s paper covers part of the gap

ASPIC+ (Prakken, A&C 2010)

- An articulated “rule-based” argumentation formalism
- There is a “simple” translation to Dung’s AF to reuse its semantics concepts
- Other formalisms (e.g. ABA and Deflog) are shown to be special cases of ASPIC+
- Some simple natural language examples are given in the paper

Abstract Dialectical Framework

- ADF = dependency graph + acceptance conditions
- Motivations from “real world” (proof standards in legal reasoning)

ADFs are certainly less abstract than AFs,

AFs are a special case of ADFs

Abstract Dialectical Framework (Brewka & Woltran, KR 2010)

- KR'10: a short natural language example (from the literature) directly translated into the framework
- IJCAI 13: ADFs "not considered primarily as a KR tool"
- Idea of "argumentation middleware" related with the "translational approach" of ASPIC
- ADF as an alternative target for translation

Abstract Dialectical Framework

- It has been shown that ADF is able to represent:

  - attacks from sets of arguments (a variation of Dung's framework)

  - Carneades*, a formalism for representation and evaluation of arguments, encompassing different proof standards

  *Carneades is also the name of an implementation of the formalism

Logic based argumentation (Besnard & Hunter, AIJ 2001)

- The core of the AIJ-01 paper is “completely abstract” (only symbols) but a specific section is devoted to use argumentation to represent and reasoning with structured news reports
- In the book many simple natural language examples are used
- The chapter “Practical argumentation” aims at showing that “basic” formalisms fail to capture the properties of “real” arguments: it uses several extended quotes from newspapers

Value-Based AFs (Bench-Capon, JLC 2003)

- Mentions the need to represent “persuasion” addressed to an audience, with particular reference to legal reasoning
- Includes a section concerning an example of moral dilemma taken from the literature
- Subsequent papers present (paper-based) application examples in law and medicine and an implemented system for e-democracy (Parmenides)

Preference-based AFs (Amgoud & Cayrol, AMAI 02)

- General motivations, some links with other formalisms, purely abstract examples

Bipolar AFs (Amgoud et al., Int.J.Intell.Sys 2008)

- Simple examples in natural language

EAFs (Modgil, AIJ 09)

- Relationships with other formalisms (Value-Based, ALP-DP=Argument-base Logic Programming with Defeasible Priorities)
- Simple natural language examples

Abstract argument systems (Vreeswijk, AIJ 97)

- Purely abstract and simple examples

Collective attacks (Nielsen & Parsons, COMMA 06)

- Simple examples in natural language but
- Original motivation: argumentation about Bayesian networks

Weighted argument systems (Dunne et al., AIJ 2011)

- Simple examples in natural language

"Fact appeal" is more rare

- Inductive arguments + Dung + preferences + meta-arguments + aggregation with "superiority graph" = a framework for representing and synthesizing knowledge from clinical trials involving multiple outcome indicators (Hunter & Williams, AIM 2012)

- Explanatory argumentation frameworks explicitly defined to model scientific debates (Seselja & Strasser, Synthese 2013)

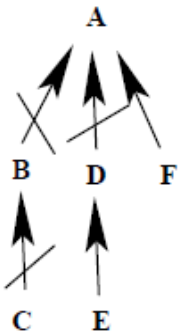
Summing up

- “Strong” applications seem rather rare in abstract argumentation papers
- The pair natural language examples + relations with other (quite close) formalisms is rather common
- This seems reasonable in the view of generality, but risks to leave gaps with “real” application
- Bridges with not-so-close formalisms were drawn in Dung and maybe should be looked for with more “determination”
- Natural language only is so . . . slippery

Natural language examples

Example 7 *During a discussion between doctors about the installation of a prosthesis on the patient X, the following arguments are presented:*

- *A: X has difficulties for walking, we must install a prosthesis.*
- *B: the installation of a prosthesis needs a surgical operation with an anaesthesia which is very risked for the patient and we do not want to take a risk.*
- *C: we can use a local anaesthesia, so there is no more risk.*
- *D: a surgical operation presents also important risks of post-infections.*
- *E: there are more and more kinds of nosocomial infections in the hospital and it is very difficult to cure them.*
- *F: the classical treatments (injections) are unable to cure X's knee problem, we must install a prosthesis.*

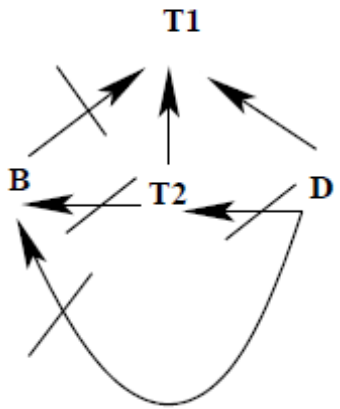


In this example, B and D are direct defeaters of A, F is a direct supporter of A, C is a direct defender of A and E is an indirect defeater of A.

Natural language examples

Example 8 *The following discussion between 3 agents (Tom, Ben and Dan) about a hiking is presented:*

- T_1*: Today we have time, we go hiking.*
- B*: No, the weather is cloudy, clouds are a sign of rain, it is more cautious to cancel the hiking.*
- T_2*: These clouds are early patches of mist, the day will be sunny without cloud, so we can begin the hiking.*
- D*: No, these clouds are not early patches of mist. So, the day will not be sunny but cloudy. However, it will not rain, so we can begin the hiking.*



Natural language examples

- Arguments correspond to:
  - » Atomic and less atomic sentences
  - » Deductive and “less deductive” sentences

- *A: X has difficulties for walking, we must install a prosthesis.*
- *E: there are more and more kinds of nosocomial infections in the hospital and it is very difficult to cure them.*

- T_1*: Today we have time, we go hiking.*
- *B: No, the weather is cloudy, clouds are a sign of rain, it is more cautious to cancel the hiking.*

Natural language examples

- Support corresponds to
  - » Same conclusion
    - *A: X has difficulties for walking, we must install a prosthesis.*
    - *F: the classical treatments (injections) are unable to cure X's knee problem, we must install a prosthesis.*
  - » Additional considerations
    - *D: a surgical operation presents also important risks of post-infections.*
    - *E: there are more and more kinds of nosocomial infections in the hospital and it is very difficult to cure them.*
  - » Defense
    - T_1: *Today we have time, we go hiking.*
    - *B: No, the weather is cloudy, clouds are a sign of rain, it is more cautious to cancel the hiking.*
    - T_2: *These clouds are early patches of mist, the day will be sunny without cloud, so we can begin the hiking.*

Applications

- “I read that you will talk about applications of argumentation.

  What applications?”

- A retrospective from COMMA conference

- And examples “from the wild”

COMMA application history

- COMMA 2006: no demo session, 3 application oriented (AO) sessions
  - » Argumentation tools (4 papers)
  - » Applications (3 papers)
  - » Agents (4 papers)
- COMMA 2008: demos + 3 AO sessions
  - » 8 demos
  - » Tools (3 + 3 papers)
  - » Algorithms and systems (4 papers)

COMMA application history

- COMMA 2010: demos + 3 AO sessions
  - » 8 demos
  - » Languages and architectures (3 papers)
  - » Dialogue and agent systems (5 papers)
  - » Practical applications (5 papers)
- COMMA 2012: demos + 1 application track
  - » 13 demos
  - » Innovative application track (9 papers)

Continuing the story

- CLIMA XIV
  - » 15 argumentation related papers
  - » 8 have an application flavor

- Application-oriented efforts appear to have a reasonable (and increasing) share in the community

Looking inside

- COMMA application-flavored papers and demos (total 61)
- Partitioned into 4 classes:
  - » Proof of concept
  - » Generic abstract tools
  - » Generic system (visualization, debate, repository)
  - » Specific application (medicine, law, natural language)
- Partitioned the last two classes:
  - » prototype
  - » advanced

Looking inside

Proof of concept	Generic abstract tool	Generic system (prototype)	Generic system (advanced)	Specific application (prototype)	Specific application (advanced)
14	13	15	9	10	0

Application areas

Application area	#
Law	5
Medicine	4
E-democracy	2
Recommender systems	2
Natural language	2
Computer Aided Instruction	1
Computer security	1
Robotics	1

Abstract model(s) adopted

Dung's AF (and variants)	Arg Schemes	IBIS	ASPIC (+)	ABA	DeLP	Logical

Abstract model(s) adopted

Dung's AF (and variants)	Arg Schemes	IBIS	ASPIC (+)	ABA	DeLP	Logical
18	28	6	8	3	5	3

Combinations

Combined models	#
Schemes + Dung's AF	5
Schemes + IBIS	5
Schemes + ASPIC	4
Dung's AF + IBIS	0
ASPIC + IBIS	0
…	0

Some abstract considerations

- Argument schemes are more represented in application papers than in abstract papers
- Often combined with more formal models
- This seems to happen without formal foundations
- Combinations seem to deserve more attention by foundational studies
- The absence of some combinations (e.g. IBIS + Dung) is a gap to be filled or reflects “unmixable” underlying notions? (to be analyzed)

Some practical considerations

- Generic systems prevail over specific applications
- No advanced specific applications
- A look outside literature “into the wild”

The power of the general

- Computational argumentation needs not “motivating applications” since argumentation is present in every daily activity
- People like (and need) to argue on anything
- People may like (and need) to have support for this
- This is even more true on the web

Tools for the general

- A lot of tools supporting construction and visualization of argumentative processes either for professional or occasional use

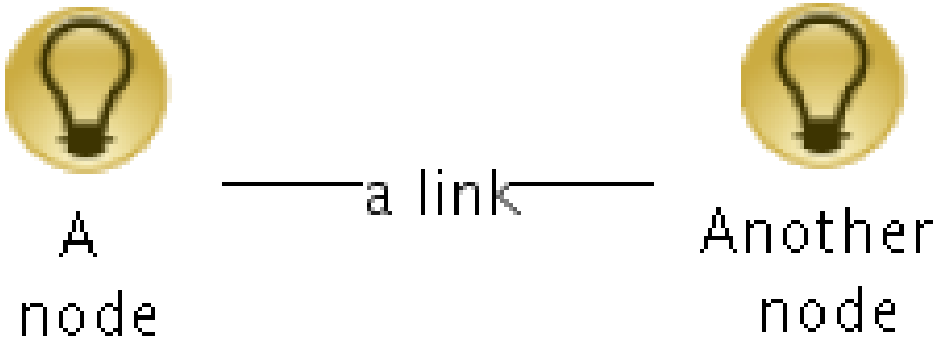
- Many (but not all) of these tools do not seem to consider explicitly research on computational argumentation (and viceversa)

The power of the general: not just arguments

- Some of these tools (e.g. Compendium, designVUE) are conceived to support various forms of graphical connections of ideas (argumentation is just one of them):
  - » Mind maps
  - » Issue maps (IBIS)
  - » Topic maps
  - » Argument maps
  - » * maps

The power of the general: Compendium NG

From the “Use examples” page of the Compendium NG web site

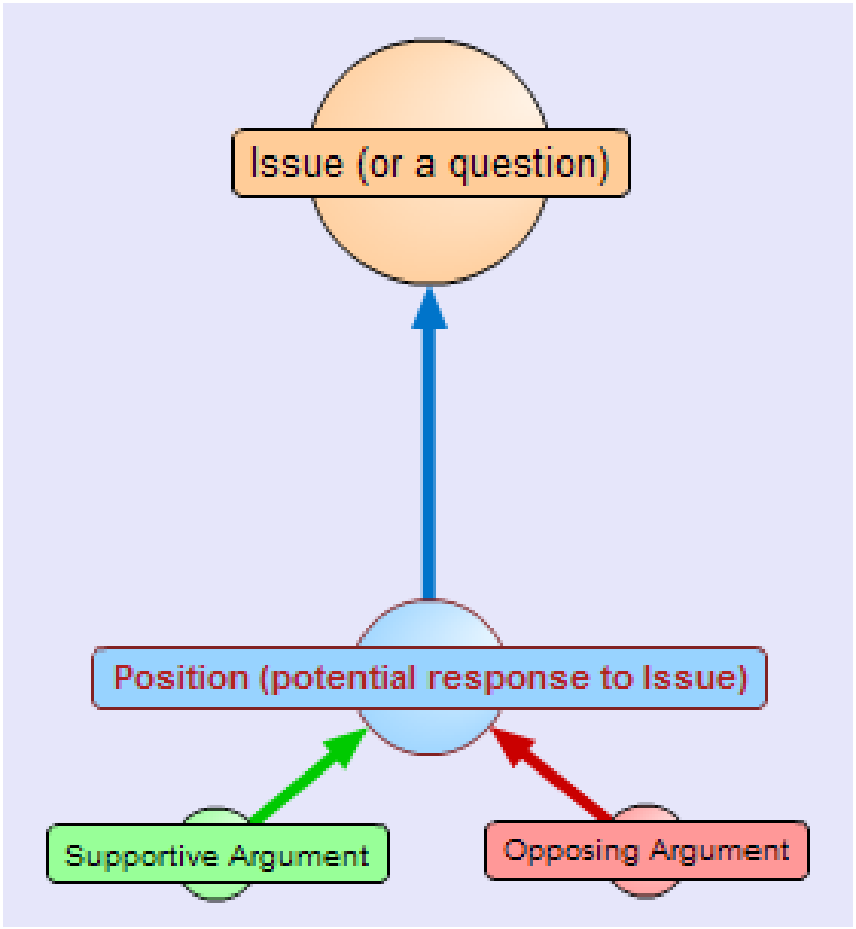


- Rather abstract indeed
- Arbitrary conceptual complexity
- “Direct fit” with Abstract Dialectical Frameworks

The power of the general: DebateGraph.org

- Several different views (3 main styles + variants)
  - » Bubble
  - » Tree
  - » Box
- Many types of nodes and of relations among nodes available
- Maps can be very complex
- Allows rating
- The argumentation-related subset is IBIS-like

DebateGraph.org



	Map Home	The starting point of a map / debate – which may include many issues – that describes the broad subject area addressed by the map / debate.
	Issue	An issue or question arising within the map / debate.
	Position	A potential answer or option suggested in response to an Issue or question.
	Component	A distinct part of a complex position; identified separately and analyzed on its own merits.
	SupportiveArgument	An argument that supports another idea (for example a position or another argument).
	OpposingArgument	An argument that opposes another idea (for example a position or another argument).
	ArgumentGroup	A broad set of arguments that can be interpreted as net supportive or net opposing depending on the relative weight attached to each—e.g. when a humanitarian case is made in favour of waging a war (to relieve suffering under a dictatorship) AND against waging the war (innocent people will die).
	PartArgument	A co-premise that works with other co-premises to support an argument or conclusion.
	Decision	A decision taken in response to an Issue
	Task On Schedule	A task that is expected to be completed on time
	Task at Risk of Delay	A task that is falling behind schedule.
	Task Overdue	A task that is overdue.
	Task Completed	A task that has been completed.
	Protagonist	A significant actor in a map / debate (to whom arguments may be attributed).
	Map Note	A note about the map structure, moderation policy, development schedule, etc.

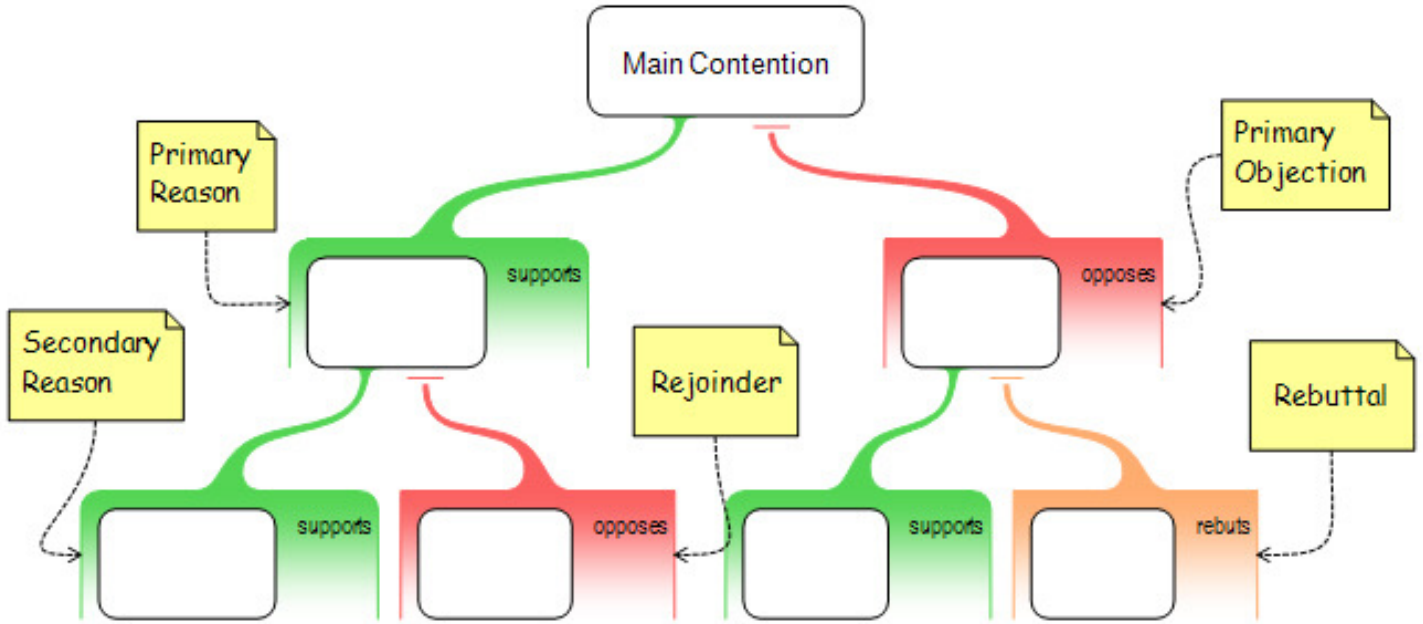
The power of the general: argumentation voyeurism

- Many tools for argument visualization (and storage)
- Those closer to research (e.g. Araucaria, AIFdb) use quite articulated models
- Others are more basic (more abstract or more simple minded)

- “Visualizing argumentation” book (2003): 9 chapters, several tools and application experiences, many using IBIS

Rationale

- Rationale is a commercial argument mapping software tool, mainly conceived to teach critical thinking (rationale.austhink.com)



Rationale

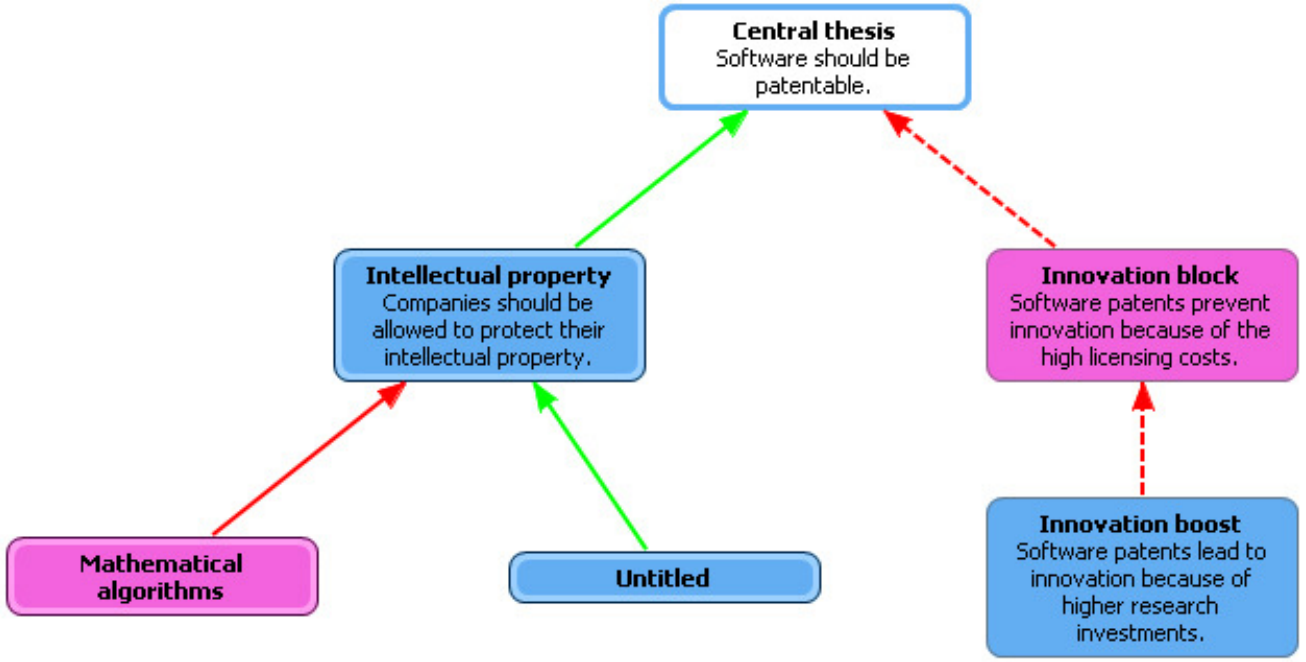
- A tree model (indeed rather common in the literature)
- Fits Dung's AF or Bipolar AF or IBIS depending on the exact interpretation of the generic terms used

CMU Argument diagramming course (with iLogos tool)

- Insists on internal structure and different types of arguments
- Quickly mentions the existence of objections and replies to objections
- Argument evaluation concerns their structure and type, not the presence of objections

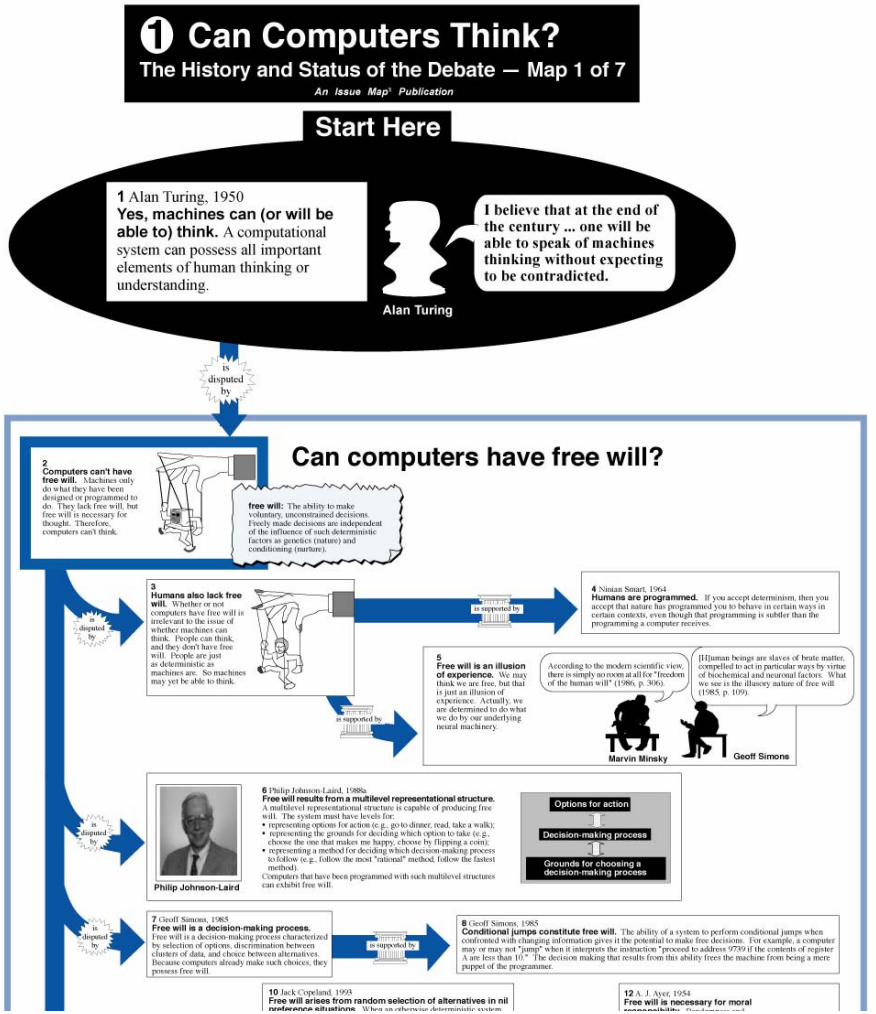
Argunet.org

- Argument map editor
- Argument: conclusion from some premises
- Two kinds of relationship: support and attack



Mapping Great Debates

- Not really a tool
- Some famous posters (e.g. “Can computers think?”) called argument maps
- Free text excerpts + “is supported by” and “is disputed by” relations



DiscourseDB

- Repository of political commentaries
- Natural language items
- Topics contain positions
- Each position has For, Against, and Mixed items

DiscourseDB

Act should be passed

For	Who Cooked the Planet? by Paul Krugman (*The New York Times*, July 25, 2010) (view) We're Gonna Be Sorry by Thomas Friedman (*The New York Times*, July 24, 2010) (view) Back to the future on energy by Scot Lehigh (*The Boston Globe*, June 18, 2010) (view) Can I Clean Your Clock? by Thomas Friedman (*The New York Times*, July 4, 2009) (view) Cap and Traitors by Michael Gerson (*The Washington Post*, July 1, 2009) (view) Just Do It by Thomas Friedman (*The New York Times*, June 30, 2009) (view) Betraying the Planet by Paul Krugman (*The New York Times*, June 28, 2009) (view) A big step against climate change by The Philadelphia Inquirer editorial board (*The Philadelphia Inquirer*, June 26, 2009) (view) The House and Global Warming by The New York Times editorial board (*The New York Times*, June 26, 2009) (view) The farm lobby vs. the global warming bill by Los Angeles Times editorial board (*Los Angeles Times*, June 26, 2009) (view) Cap and trade will clean and fuel our economy, too by Houston Chronicle editorial board (*Houston Chronicle*, June 25, 2009) (view) First step toward a balanced energy policy by The Dallas Morning News editorial board (*The Dallas Morning News*, May 8, 2009) (view)
Against	Cap and trade: It's the cost, stupid by Vincent Carroll (*The Denver Post*, August 4, 2010) (view) The Death of Cap and Tax by The Wall Street Journal editorial board (*The Wall Street Journal*, August 1, 2010) (view) Bam's climate Rx: All pain, no gain by Patrick Michaels (*New York Post*, June 21, 2010) (view) Obama's Answer To Spill Comes Up Short by Charles Krauthammer (*Investor's Business Daily*, June 18, 2010) (view) Bam's economy-killer by New York Post editorial board (*New York Post*, June 17, 2010) (view) Spill no justification for cap-and-trade scheme by The Orange County Register editorial board (*The Orange County Register*, June 16, 2010) (view) Waxman-Markey Deserves to Die by Pete du Pont (*The Wall Street Journal*, July 26, 2009) (view) The 'Cap And Tax' Dead End by Sarah Palin (*The Washington Post*, July 14, 2009) (view) Cap and trade or Smoot-Hawley? by The Denver Post editorial board (*The Denver Post*, July 5, 2009) (view) Green nonsense by Jack Kelly (*Pittsburgh Post-Gazette*, July 5, 2009) (view) Cap-and-trade bill not likely to deliver promised jobs by The Detroit News editorial board (*The Detroit News*, July 2, 2009) (view) Written to fail by Rich Lowry (*New York Post*, June 30, 2009) (view) Cap and frown by The Washington Times editorial board (*The Washington Times*, June 29, 2009) (view) Cap-and-trade mess by Financial Times editorial board (*Financial Times*, June 28, 2009) (view) Cap and trade is wrong solution by The Denver Post editorial board (*The Denver Post*, June 26, 2009) (view) Climate change bill all pain, no gain by The Orange County Register editorial board (*The Orange County Register*, June 26, 2009) (view) Legislators need to reveal costs of cap-and-trade bill by The Detroit News editorial board (*The Detroit News*, June 26, 2009) (view) The Cap and Tax Fiction by The Wall Street Journal editorial board (*The Wall Street Journal*, June 26, 2009) (view) The hot one from the Democrats by Wesley Pruden (*The Washington Times*, June 26, 2009) (view) Man-Made Disaster by Investor's Business Daily editorial board (*Investor's Business Daily*, June 25, 2009) (view) Waxman's Economy Killer by Steven Milloy (*Human Events*, June 25, 2009) (view) Cap and trade: It's an economic catastrophe by David Harsanyi (*The Denver Post*, June 21, 2009) (view) Slow the rush by The San Diego Union-Tribune editorial board (*The San Diego Union-Tribune*, June 19, 2009) (view) The Immorality Of Waxman-Markey: Intense Pain, No Environmental Gain by Paul Driessen (*Investor's Business Daily*, June 16, 2009) (view) Cap-and-Trade: All Cost, No Benefit by Martin Feldstein (*The Washington Post*, June 1, 2009) (view) We can't wait to see how this boondoggle blows up by Las Vegas Review-Journal editorial board (*Las Vegas Review-Journal*, May 28, 2009) (view) Cap and trade, with handouts and loopholes by The Economist editorial board (*The Economist*, May 21, 2009) (view) Cap-and-trade stumbling in D.C. by The Orange County Register editorial board (*The Orange County Register*, May 10, 2009) (view) Who Pays for Cap and Trade? by The Wall Street Journal editorial board (*The Wall Street Journal*, March 9, 2009) (view)
Mixed	Waxman-Markey by The Washington Post editorial board (*The Washington Post*, June 26, 2009) (view) A Greener Look for Coal by The Washington Post editorial board (*The Washington Post*, June 25, 2009) (view) So How Good Is This Climate Bill, Anyhow? by Carl Pope (*The Huffington Post*, May 22, 2009) (view)

The power of the general: online debates

- Different process and actors but editing and visualization still basic functions (possibly with facilities to use or connect to other web resources)

- Voting as a further specific feature

TruthMapping.com

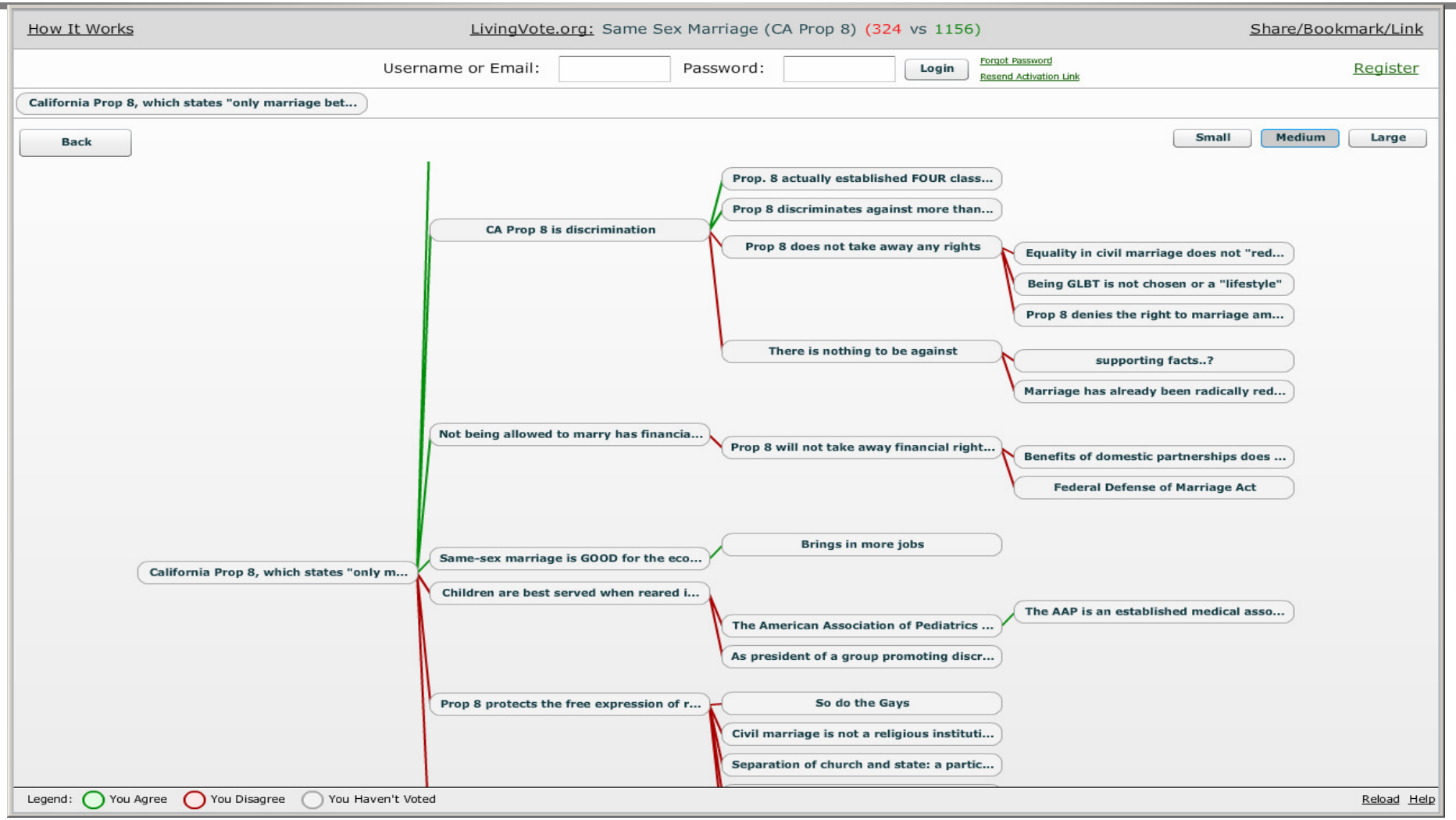
- More on premises and conclusion than on critiques (which are anyway allowed)
- Allows voting

TruthMapping.com

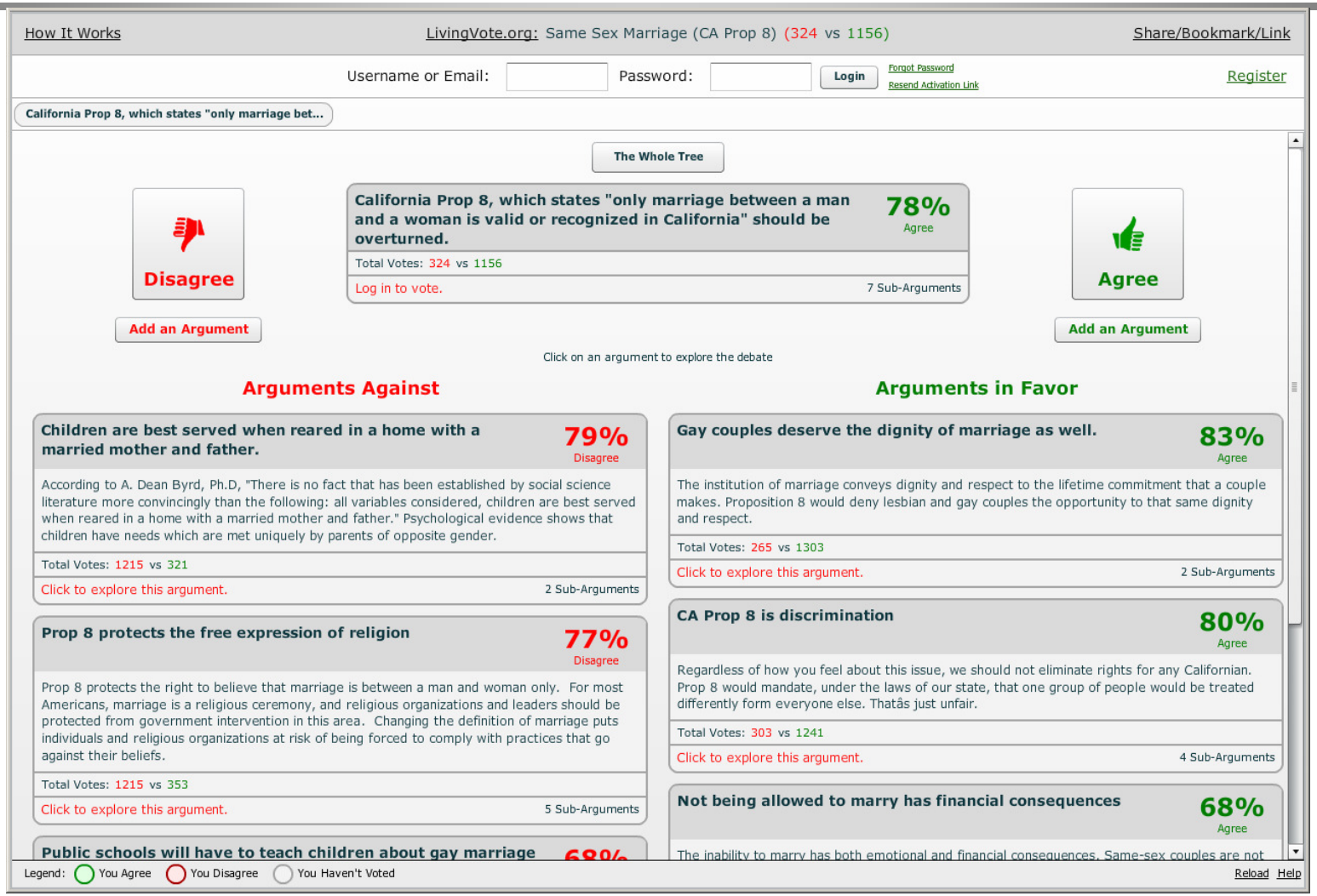
LivingVote.org

- Argument tree with argument in favor and against
- Each argument in the tree can be voted (agree/disagree)

LivingVote.org



LivingVote.org



DebatePedia (traditional)

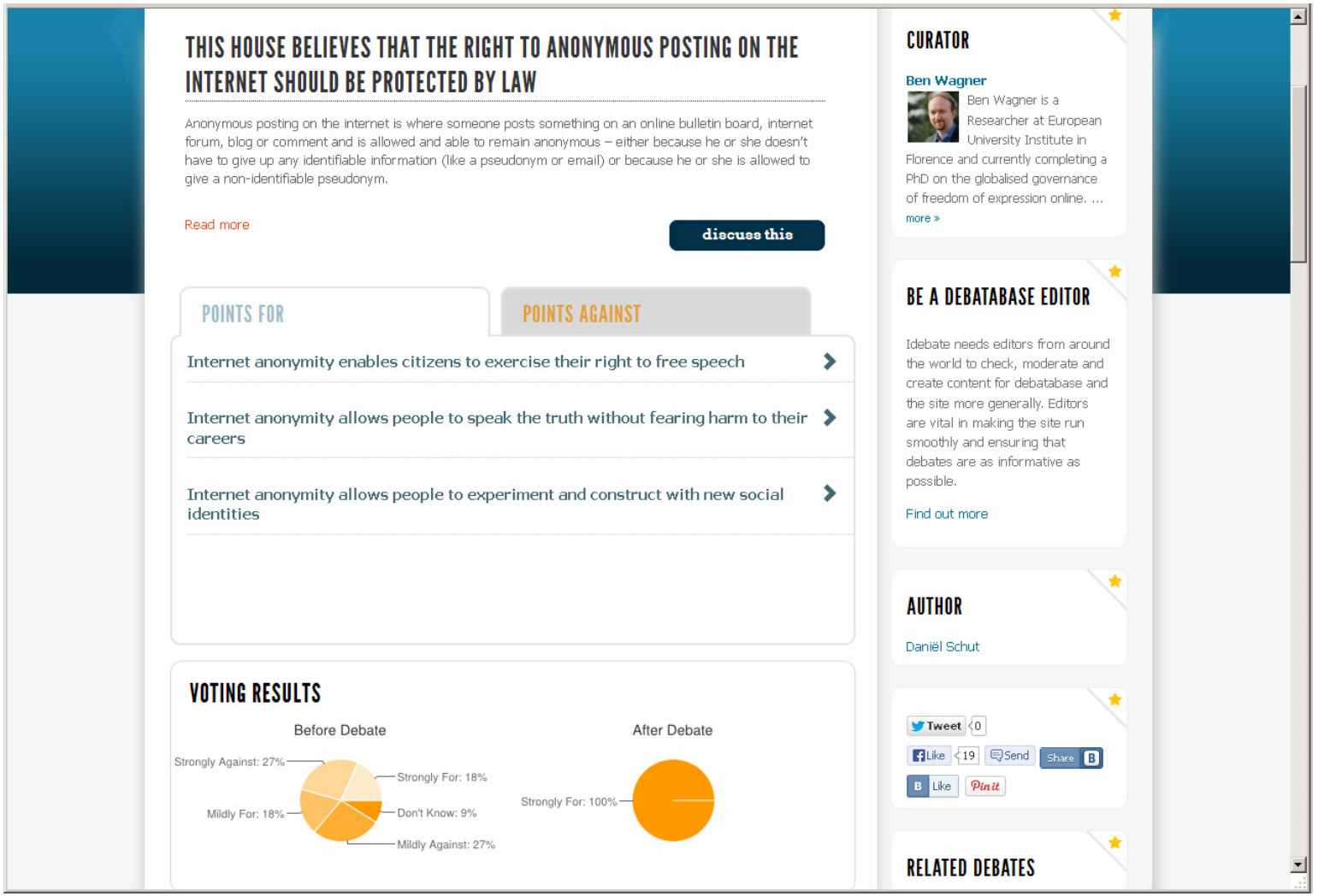
- Focus on Pro/Con debates + sources in natural language

DebatePedia (traditional)

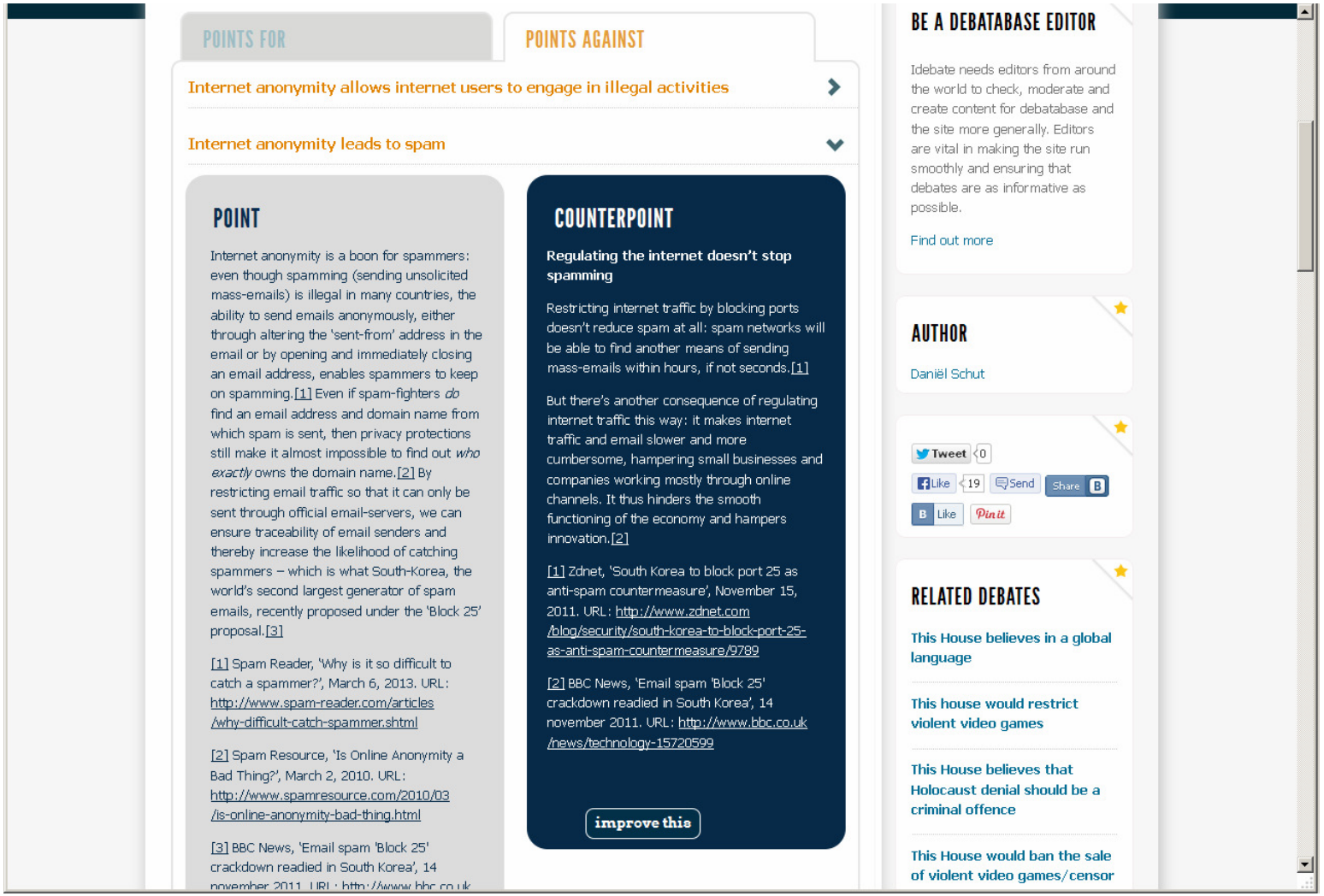
DebatePedia (new)

- Adds a level to the debate: each point For or Against has in turn a Point and Counterpoint
- Points For and Against are no more shown together
- Adds voting

DebatePedia (new)



DebatePedia (new)



The weakness of the general

- Relies on a critical step from “natural arguments” to formal schemes (as simple as they may be)
- Ambiguity on the meaning of the +/- relations (partly reflected by different names)
- Strong simplifications in some cases
- Argument evaluation is completely left to users
- No coherency check (as to my knowledge) on the voting process

Challenges of the general

- Argument extraction from natural language (a holy grail)
- The dominating bipolar representation has not such a strong counterpart in abstract research
- Disambiguating/classifying the diverse +/- and their use for argument evaluation
- Quantitative evaluations are relatively rare in abstract research (and the existing ones do not seem to fit the needs of the social evaluation context)

Advanced specific applications

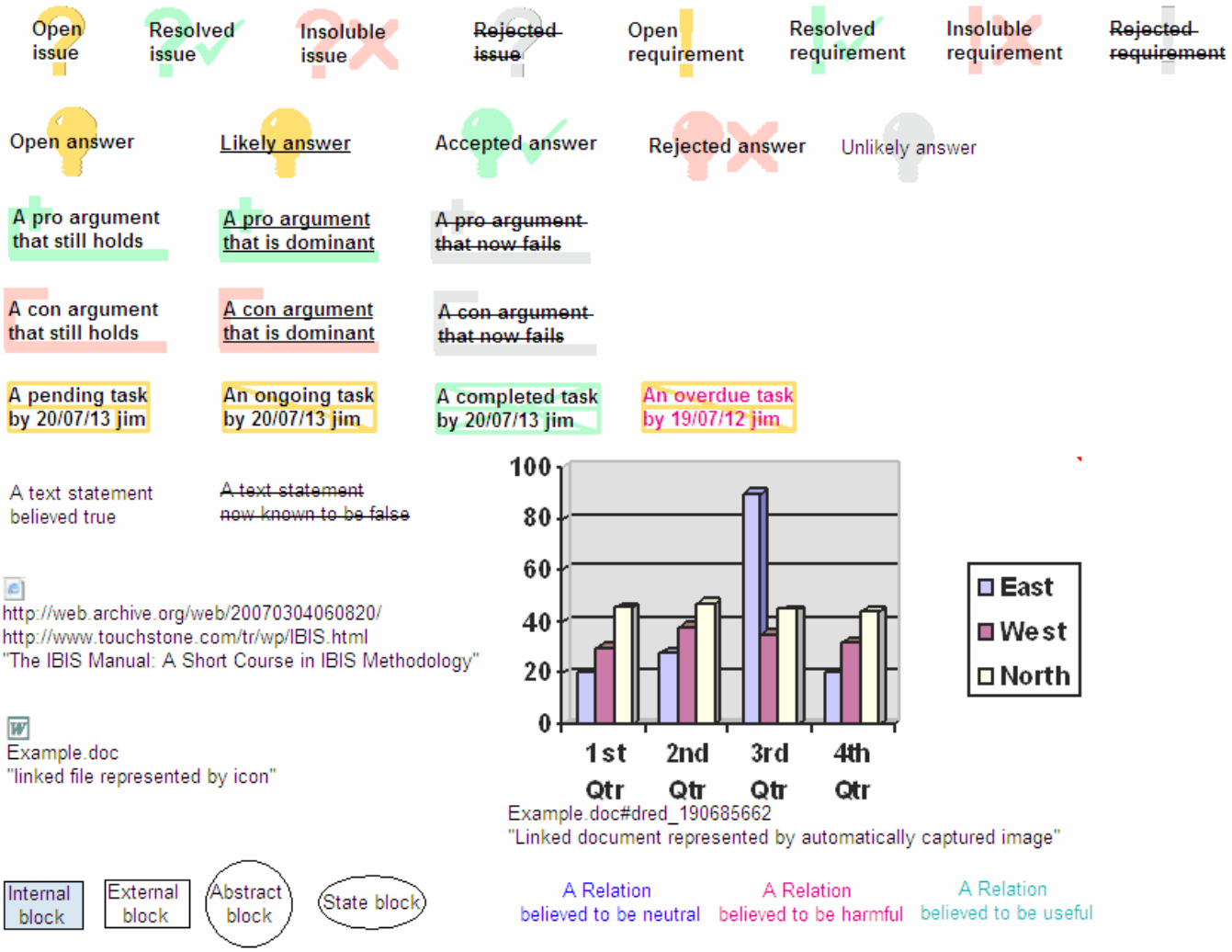
- DRed: decision rationale in design
- OpenClinical: argumentation in medicine

DRed

- Decision Rationale (or Design Rationale) editor
- Developed since 2002 with the support of Rolls Royce
- Owned and used by Rolls Royce
- Not just arguments
- IBIS-based for the argument part

- designVUE is a Free and Open Source Software tool inspired by DRed

DRed


Open issue
Resolved issue
Insoluble issue
Rejected issue
Open requirement
Resolved requirement
Insoluble requirement
Rejected requirement
Open answer
Likely answer
Accepted answer
Rejected answer
Unlikely answer
A pro argument that still holds
A pro argument that is dominant
A pro argument that now fails
A con argument that still holds
A con argument that is dominant
A con argument that now fails
A pending task by 20/07/13 jim
An ongoing task by 20/07/13 jim
A completed task by 20/07/13 jim
An overdue task by 19/07/12 jim
A text statement believed true
A text statement now known to be false
http://web.archive.org/web/20070304060820/
http://www.touchstone.com/tr/wp/IBIS.html
"The IBIS Manual: A Short Course in IBIS Methodology"
Example.doc
"linked file represented by icon"
100
80
60
40
20
0
1st Qtr
2nd Qtr
3rd Qtr
4th Qtr
East
West
North
Example.doc#dred_190685662
"Linked document represented by automatically captured image"
Internal block
External block
Abstract block
State block
A Relation believed to be neutral
A Relation believed to be harmful
A Relation believed to be useful

DRed

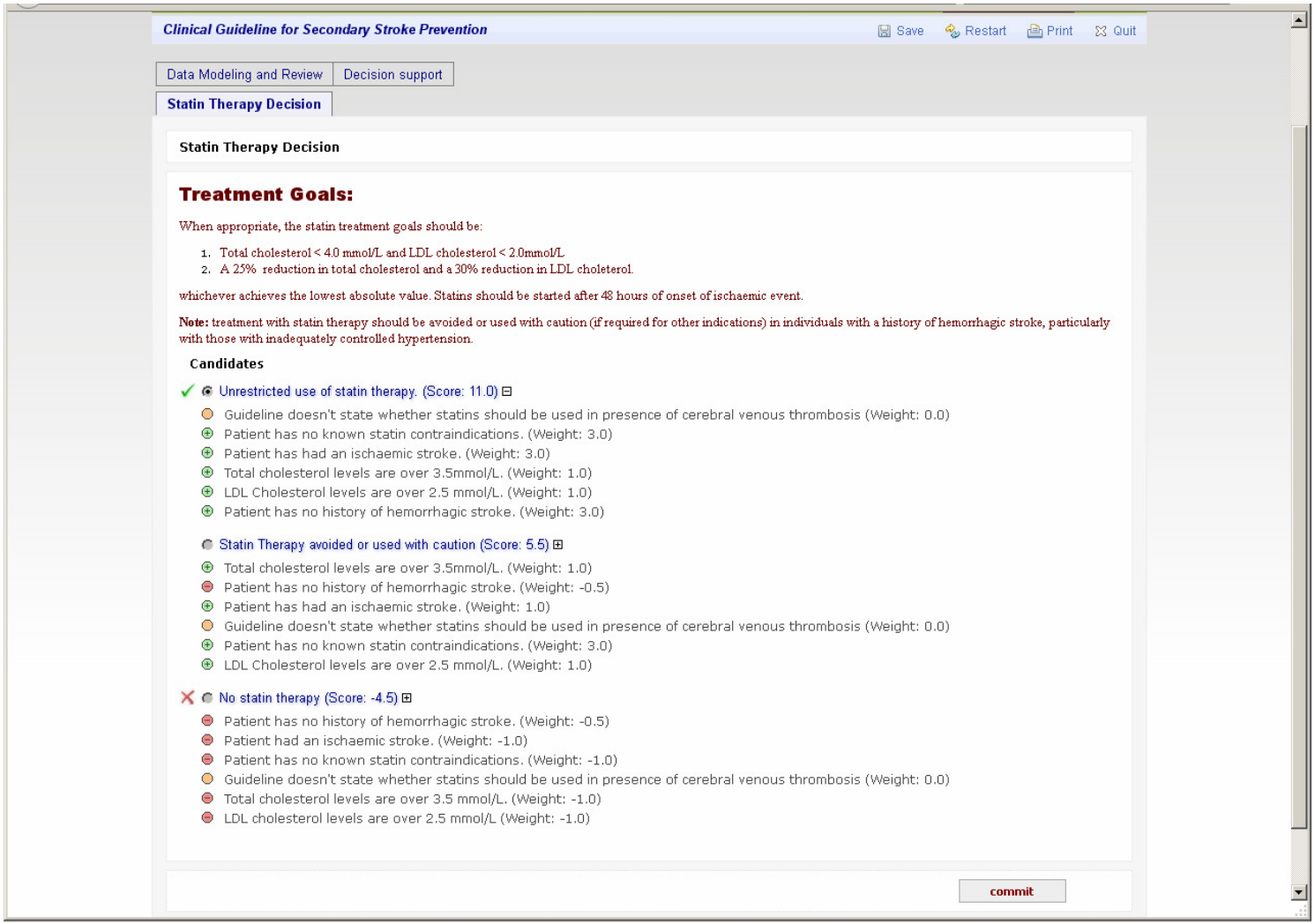
- Includes several concepts of argument evaluation
- … which is left to the users

- Formal argument evaluation in IBIS
- Analysis of specific concepts (dominant arguments)
- Qualitative evaluation but users might appreciate some quantification too

OpenClinical.net

- Long term initiative to promote the adoption of knowledge management technologies in patient care
- Several applications available concerning the treatment of specific health problems based on guidelines
- Bipolar argument-based approach
- Evaluations (qualitative or quantitative) do not seem based on “mainstream” abstract approaches

OpenClinical.net



OpenClinical.net

News from the “real world”

- Examples of long-standing argument-related specific applications exist
- Complex problems addressed with relatively simple bipolar approach
- Automated evaluation not present or not completely traceable (and apparently not based on mainstream abstract formalisms)
- Quantitative evaluation (sometimes)
- Application specific adjustments

Some defeasible conclusions

- Abstractions for argumentation are well-developed mainly for logicaly b(i)ased parts and conflict management
- The “abstract area” is far from being mature, with new directions to be developed and many links between different abstractions to be investigated
- The unification of some basic notions (attack, support) at the abstract level might hide (and mistreat) some conceptual distinctions important at the practical level: need for richer ontologies

Some defeasible conclusions

- Prototypical applications of prominent literature abstractions are not rare
- Argument extraction from natural language is a grand challenge
- … which seems to call for a lot of complications and distinctions
- ... but real systems (general or specific) suggest that users prefer quite simple bipolar schemes
- Automated evaluation (with or without numbers) in these systems is an almost grand challenge

Are you ready to cross the line?


Thank you
for your attention!