Computational Argumentation – Part XIV

Conclusion

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Outline

- Argumentation (recap)

- Computational argumentation (recap)

- *Why* computational argumentation (revisited)

- Final conclusion

Argumentation (recap)

Why do people argue?

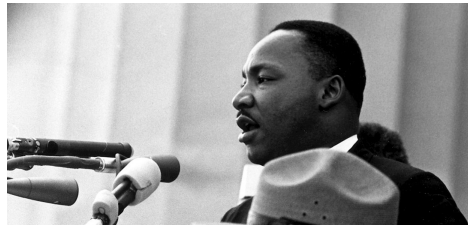- **Reasons for argumentation**
  (Freeley and Steinberg, 2009)
  - No (clearly) correct answer or solution
  - A (possible) conflict of interests or positions
  - So: Controversy

- **Goals of argumentation**
  (Tindale, 2007)
  - Persuasion
  - Agreement
  - Justification
  - Recommendation
  - Deliberation
    ... and similar

Some controversial issues

iphone vs galaxy

death penalty

skolstrejk för klimatet

article 13

trump

silk road

maduro

coal phase-out

affirmative action

basic income

feminism

refugees

arm exports

equal pay

annexation of crimea

#metoo

lying press

golan heights

messi vs ronaldo

tuition fees

western arrogance

whatsapp

democracy

What is argumentation?

Argument

- A claim (conclusion) supported by reasons (premises). (Walton et al., 2008)
- Conveys a stance on a controversial issue. (Freeley and Steinberg, 2009)

| Conclusion	*The death penalty should be abolished.*
Premise 1	*It legitimizes an irreversible act of violence.*
Premise 2	*As long as human justice remains fallible, the risk of executing the innocent can never be eliminated.*

- Often, some argument units are implicit. (Toulmin, 1958)
- Most natural language arguments are defeasible. (Walton, 2006)

Argumentation

- The usage of arguments to persuade, agree, deliberate, or similar.
- Also includes rhetorical and dialectical aspects.

Conclusion
Premises

Conclusion
Premises

Modeling arguments
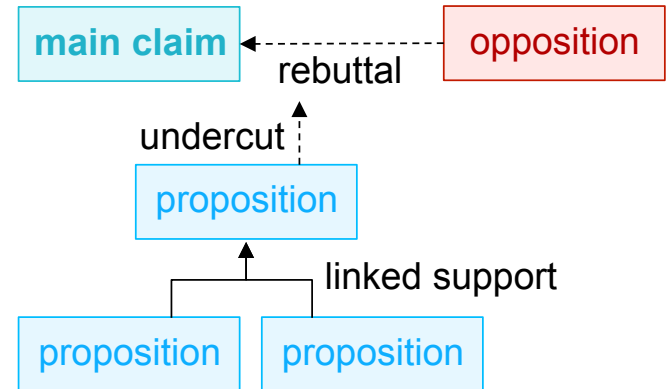
- **Focus on unit roles** (Toulmin, 1958)
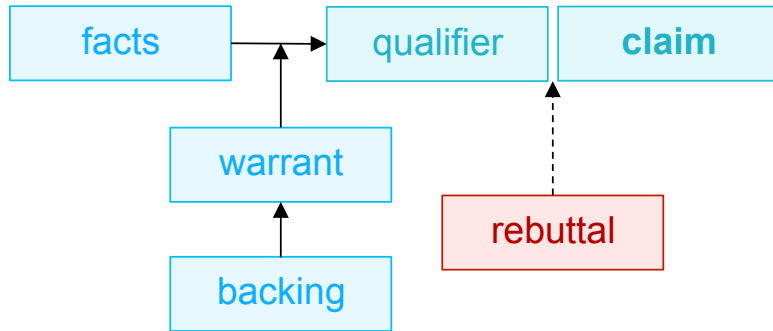
- **Focus on dialectical view** (Freeman, 2011)

- **Focus on inference** (Walton et al., 2008)

- Few real-life arguments really match this idealized model.
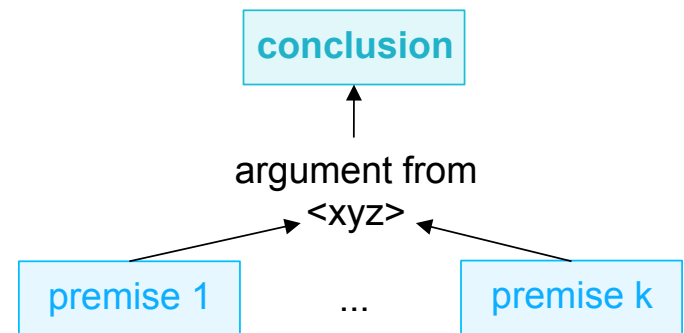
Monological and dialogical argumentation

Monological argumentation

I would not say that university degrees are useless; of course, they have their value but I think that the university courses are rather theoretical. [...]

In my opinion most of the courses taken by first and second year students aim at acquiring general knowledge, instead of specialized which the students will need in their later study and work. General knowledge is not a bad thing in principle but sometimes it turns into a mere waste of time. [...]

Dialogical argumentation
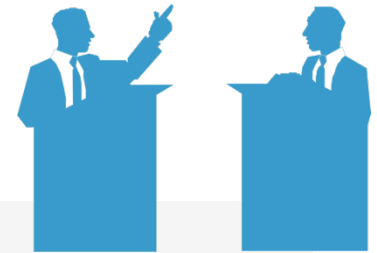
Alice. *I think a university degree is important. Employers always look at what degree you have first.*

Bob. *LOL ... everyone knows that practical experience is what does the trick.*

Alice: *Good point! Anyway, in doubt I would always prefer to have one!*

What is *good* argumentation?
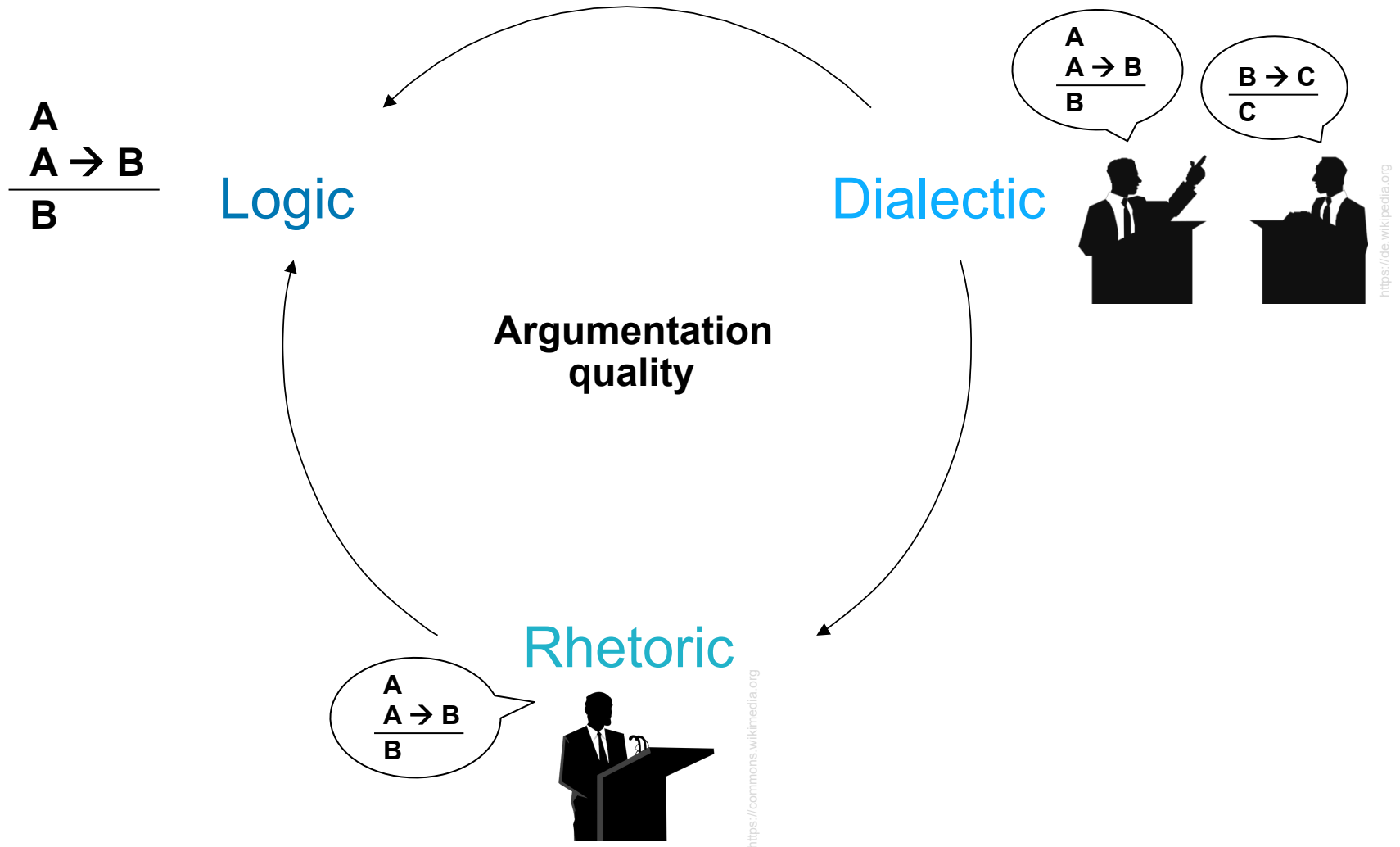
Participants in argumentation

- **Author (or speaker)**
  - Argumentation is connected to the person who argues.
  - The same argument is perceived differently depending on the author.

- **Reader (or audience)**
  - Argumentation often targets a particular audience.
  - Different arguments and ways of arguing work for different readers.

"University education must be free. That is the only way to achieve equal opportunities for everyone."

"According to the study of XYZ found online, avoiding tuition fees is beneficial in the long run, both socially and economically."

General argumentation setting
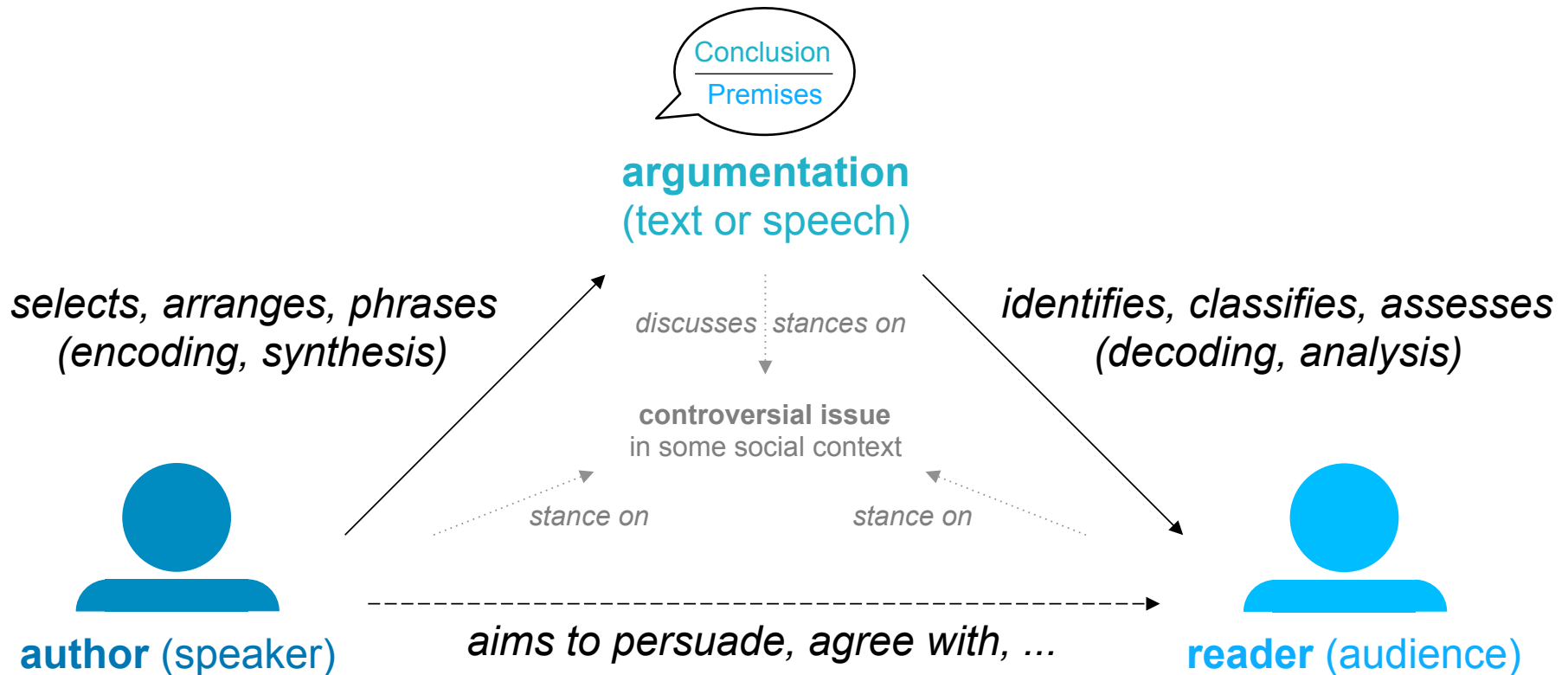
- **Notice**
  - In dialogical argumentation, the roles of the participants alternate.
  - In some cases, the audience is a third, not actively involved party.
    Example: In Oxford-style debates, the goal is to change the view of an audience that listens to both sides.

Computational argumentation (recap)

What is computational argumentation?

- **Computational argumentation**
  - The computational analysis and synthesis of natural language argumentation.
  - Usually, processes are data-driven.
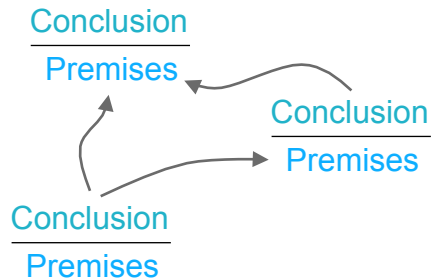
$$(1 - \alpha) \cdot \frac{p(d) \cdot |D|}{|A|}$$
$$+ \ \alpha \ \cdot \ \sum_i \frac{\hat{p}(c_i)}{|P_i|}$$

- **Main research aspects**
  - Models of arguments and argumentation
  - Computational methods for analysis and synthesis

  - Resources for development and evaluation
  - Applications built upon the models and methods

Corpus creation for computational argumentation

- **Input**
  - Text compilation. Choose the texts to be included.
  - Annotation scheme. Define what to annotate.
  - Text preprocessing. Prepare texts for annotation.

- **Annotation process**
  - Annotation sources. Choose who provides annotations.
  - Annotation guidelines. Define how to annotate.
  - Pilot annotation. Test the annotation process.
  - Inter-annotator agreement. Compute how reliable the annotations are.

- **Output**
  - Postprocessing. Fix errors and filter annotations.
  - File representation. Store the annotated texts adequately.
  - Dataset splitting. Create subsets for training and testing.

Applications of computational argumentation

Argument search
(Wachsmuth et al., 2017e)

Intelligent personal assistants
(Rinott et al., 2015)
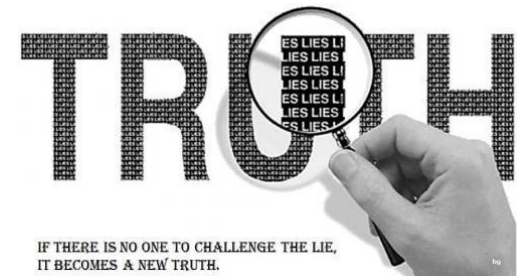

Fact checking
(Samadi et al., 2016)

IF THERE IS NO ONE TO CHALLENGE THE LIE,
IT BECOMES A NEW TRUTH.

Argument summarization
(Wang and Ling, 2016)

Automated decision making
(Bench-Capon et al., 2009)

Writing support
(Stab, 2017)

Basis of methods: Natural language processing

- **Natural language processing (NLP)** (Tsujii, 2011)
  - Algorithms for understanding and generating speech and human-readable text
  - From natural language to structured information, and vice versa

  Analysis
  Synthesis

- **Computational linguistics** (see http://www.aclweb.org)
  - Intersection of computer science and linguistics
  - Technologies for natural language processing
  - Models to explain linguistic phenomena, based on knowledge and statistics
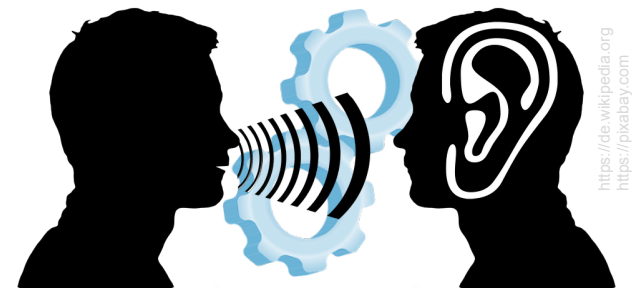
- **Main NLP stages in computational argumentation**
  - Mining arguments and their relations from text
  - Assessing properties of arguments and argumentation
  - Generating arguments and argumentative text

  Retrieval   Inference
  Assessment   Generation
  Mining   Visualization
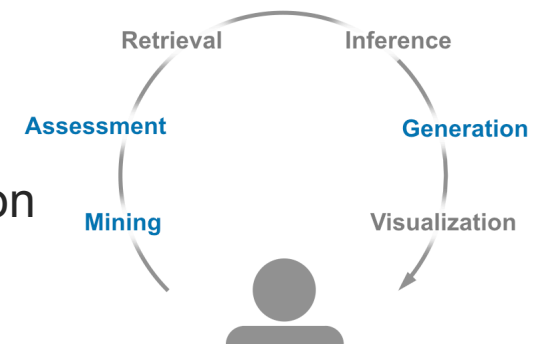
Overview of computational argumentation methods

- **Argument(ation) mining**
  1. The identification and segmentation of argumentative units.
  2. The identification and classification of supporting and objecting units.
  3. The identification and classification of argumentative stucture.

- **Argument(ation) assessment**
  4. The analysis of properties of the structure of argumentation.
  5. The analysis of the reasoning behind argumentation.
  6. The analysis of dimensions of the quality of argumentation.

- **Argument(ation) generation**
  7. The synthesis of argumentative units, arguments, and argumentation.
     A decomposition would be possible, but research on generation is still limited.

- **Notice**
  - In most applications, not all stages/tasks are needed.
  - The exact decomposition into tasks varies in literature.

Mining argumentative units

- Finding argumentative units

  - "==we should attach more importance to cooperation== during primary education. First of all, ==through cooperation, children can learn about interpersonal skills which are significant in the future life of all students==. ==What we acquired from team work is not only how to achieve the same goal with others but more importantly, how to get along with others==."

    - ◻ **Argumentative unit**

- Future Step

  - "==we should attach more importance to cooperation== during primary education. First of all, ==through cooperation, children can learn about interpersonal skills which are significant in the future life of all students==. ==What we acquired from team work is not only how to achieve the same goal with others but more importantly, how to get along with others==."

    - ◻ **Major claim**

    - ◻ **Claim**

    - ◻ **Premise**

Mining supporting and objecting units (Scherf, Shah, and Vivek, 2019)

- Segments text into argumentative unit
- Identification of claim and evidence
- **Finding and classify evidence**
    - **Supporting and Objective Statements**
    - **Analysing polarity and stance Classification**
- Deriving the Structure of Argumentation (*Next Lecture*)

Example:

Pro towards Topic

[Last Week I bought this new camera here]. [You Should buy that camera,]

Pro   *Con*

[because it has a brand new excellent sensor.] [Ok, it is quite expensive].

Pro

[But it's worth the money!]

Mining argumentative structure (Mishra, Dhar, and Busa, 2019)

- Argument mining aims to determine the argumentative structure of natural language texts.

- Argument structure is composed of :
  - Argumentative Discourse Units (ADUs),
    - premises
    - conclusions
  - together form one or more arguments in favor of or against some thesis.
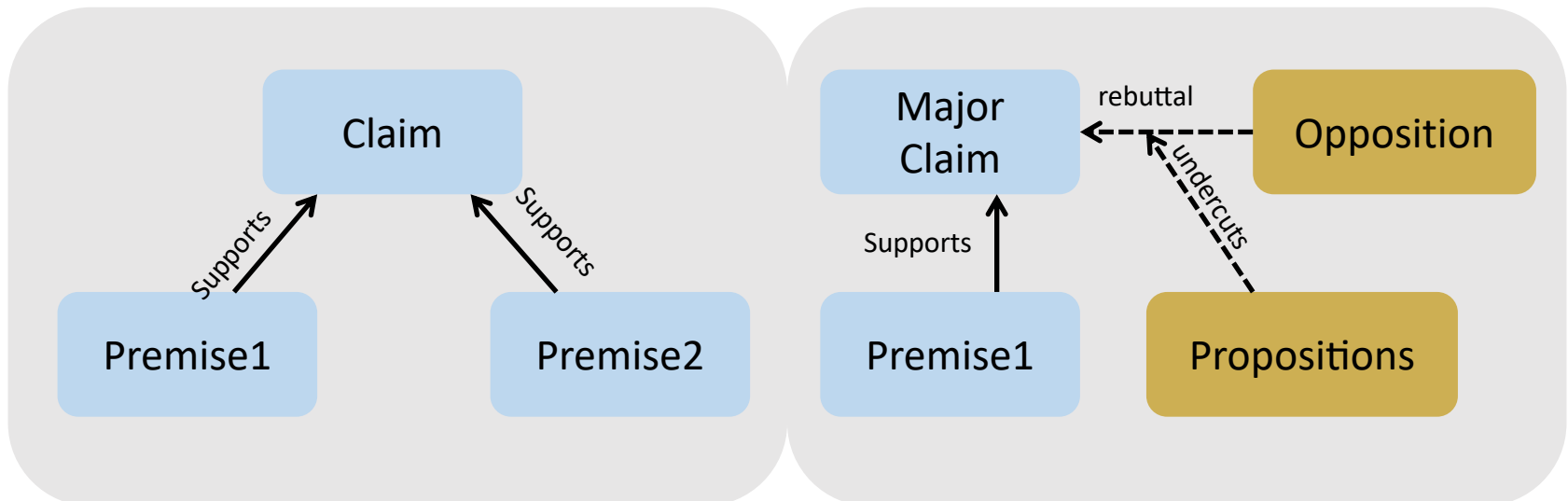
Assessing argumentative structure

- **Rhetorical argumentation**

  - "*The study of the merits of different strategies for communicating a stance.*" (Stede and Schneider, 2018)

  - "*The ability to know how to persuade.*" (Aristotle, 2007)

- **Logical argumentation** (Blair, 2012)

  - Arguments are logically good if all premises are acceptable and support the conclusion

- **Assumption:**

  - Arguments that are both logically good and rhetorically well delivered, promote persuasiveness
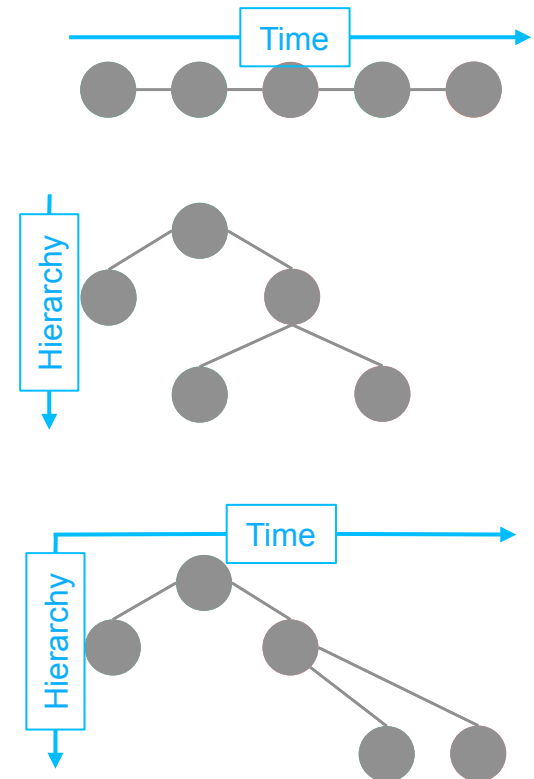
Assessing argumentative reasoning (Bülling, Kuhlmann, and Lüke, 2019)

Assessing argumentation quality

Synthesizing argumentation

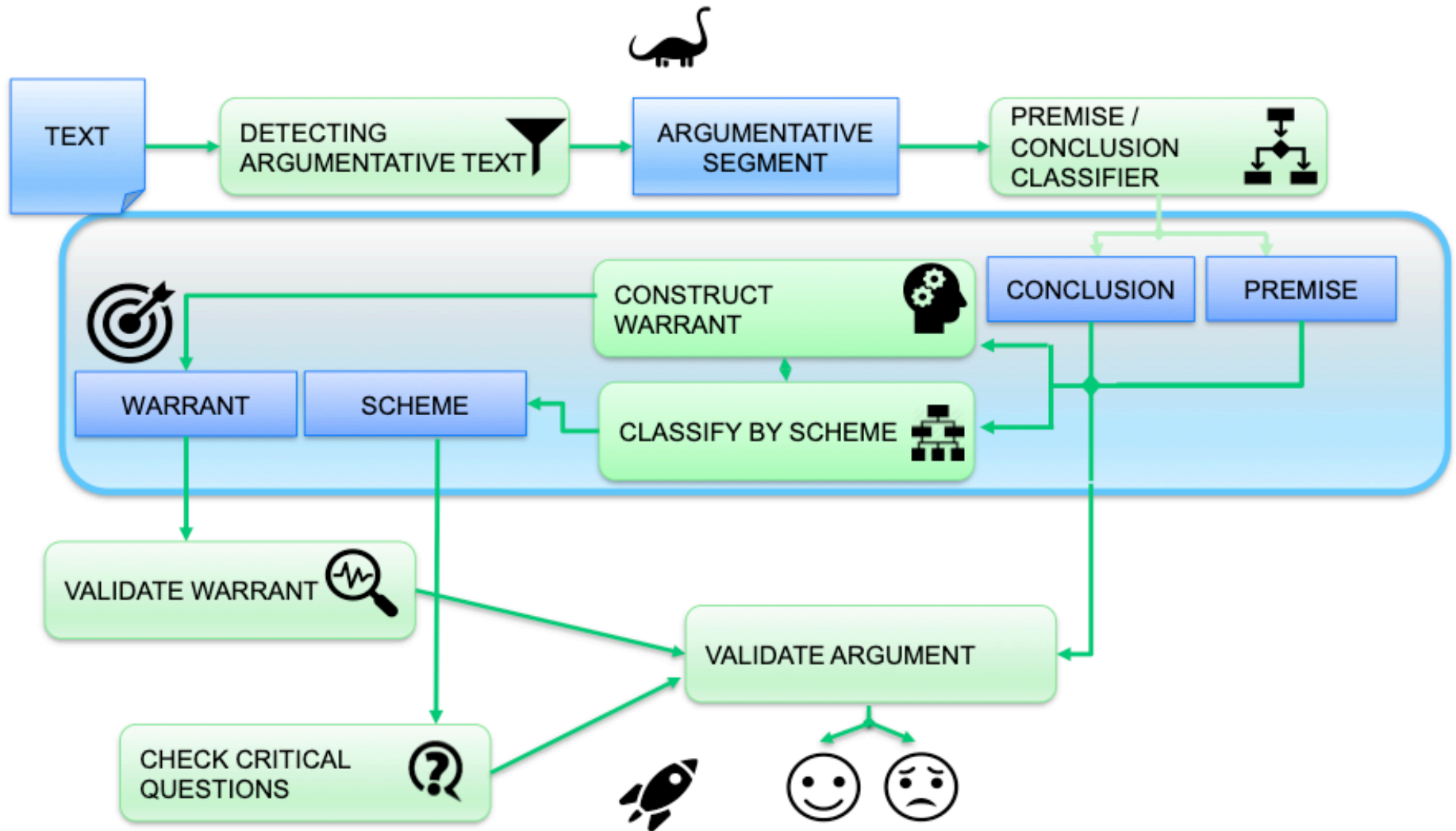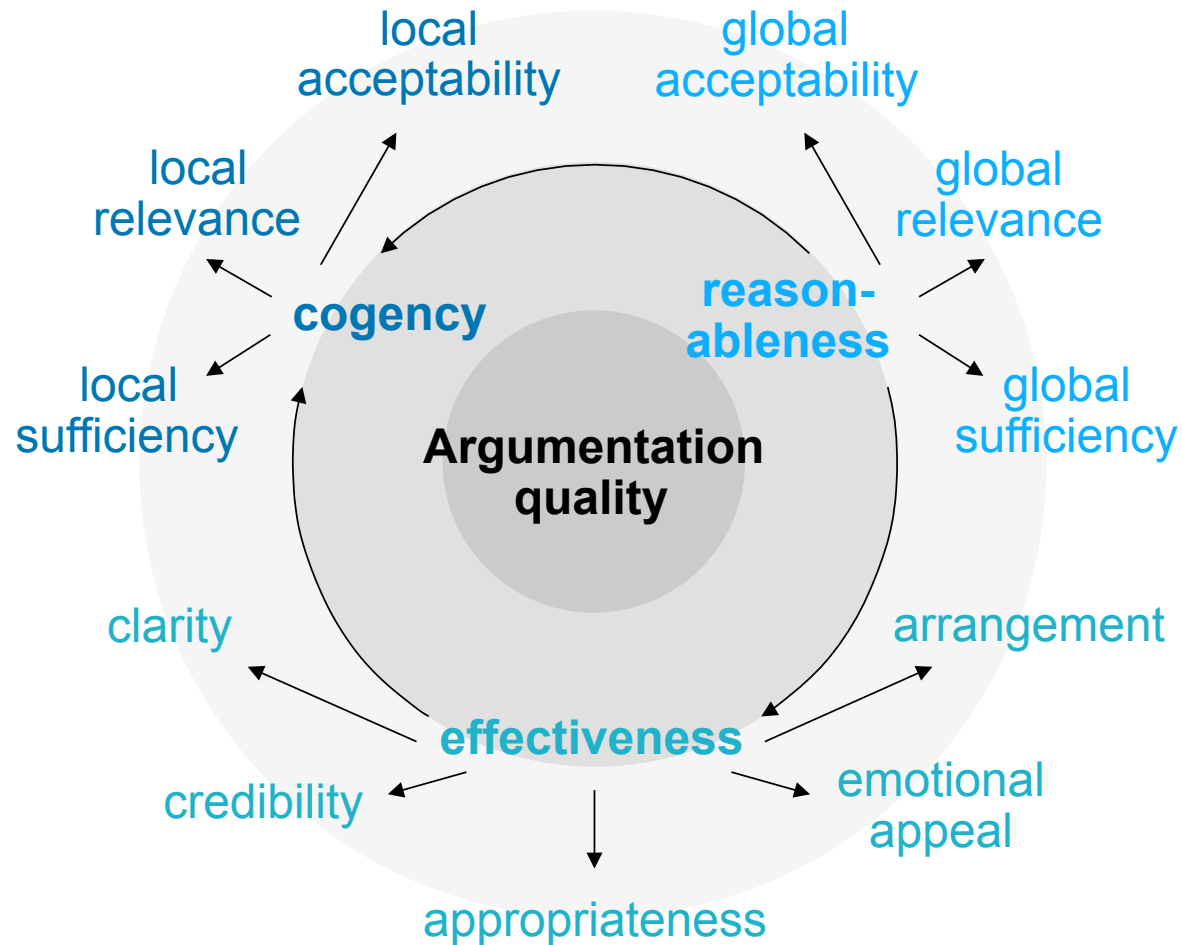| Claim Generation	→	Argument Generation	→	Argumentation Generation

- **Introduction**
  - Synthesis means "*The combination of components or elements to form a connected whole.*" (Google)

  - *Recall:* Argument is a claim (conclusion) supported by reasons. (Walton et al., 2008)
  - So a key component in synthesizing arguments is the synthesis of claims.

  - So how can we synthesize claims?
    1. One harder way to go is by employing argumentation mining to detect claims within an appropriate corpus.
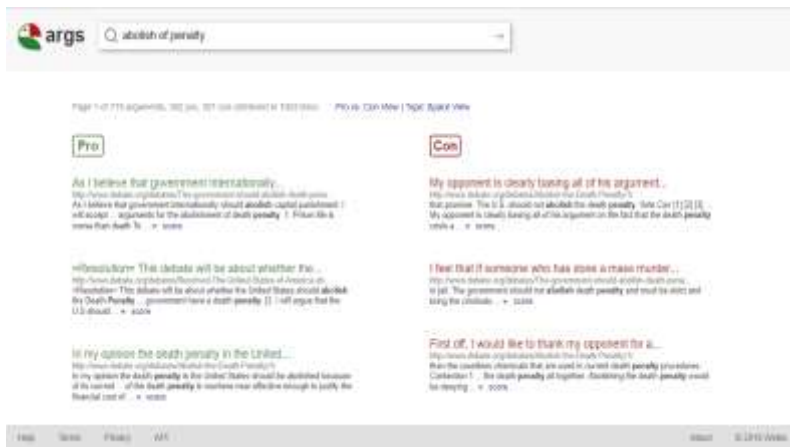   2. Is there any other easy way?

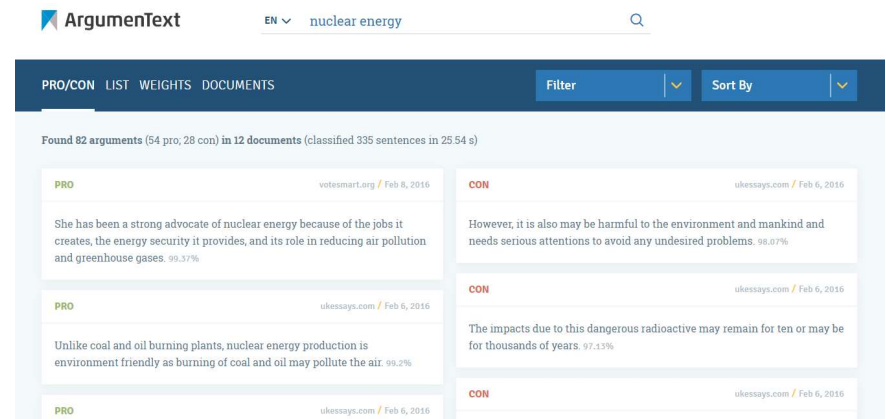# Developing an argument search engine (Gurunatha and Garg, 2019)

Project Debater

args

ArgumenText

Why computational argumentation (revisited)

(Our) Research on computational argumentation

How to model
argument relevance?
(Wachsmuth et al., 2017a)

How to retrieve the
best counterargument?
(Wachsmuth et al., 2018a)

How to reconstruct
implicit argument parts?
(Habernal et al., 2018a)

How to assess
argumentation quality?
e.g. (El Baff et al., 2018)

Retrieval

Inference

How to change the
stance of a text?
(Chen et al., 2018)

Assessment

Generation

How to build an
argument search engine?
(Wachsmuth et al., 2017e)

How to model
overall argumentation?
e.g. (Wachsmuth et al., 2017f)

How to generate text
following a strategy?
(Wachsmuth et al., 2018b)

Mining

Visualization

How to mine arguments
across domains?
(Al-Khatib et al., 2016)

How to visualize the
topic space of arguments?
(Ajjour et al., 2018)

args 🔍 feminism →
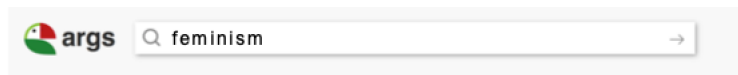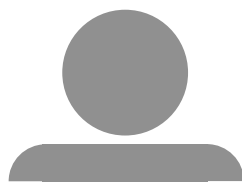
Fake news, alternative facts, and online manipulation

Remember January 22, 2017 https://www.youtube.com/watch?v=VSrEEDQgFc8 (1:36 – 2:05)

Filter bubbles and echo chambers

Filter bubbles

We get what fits our past behavior

Echo chambers
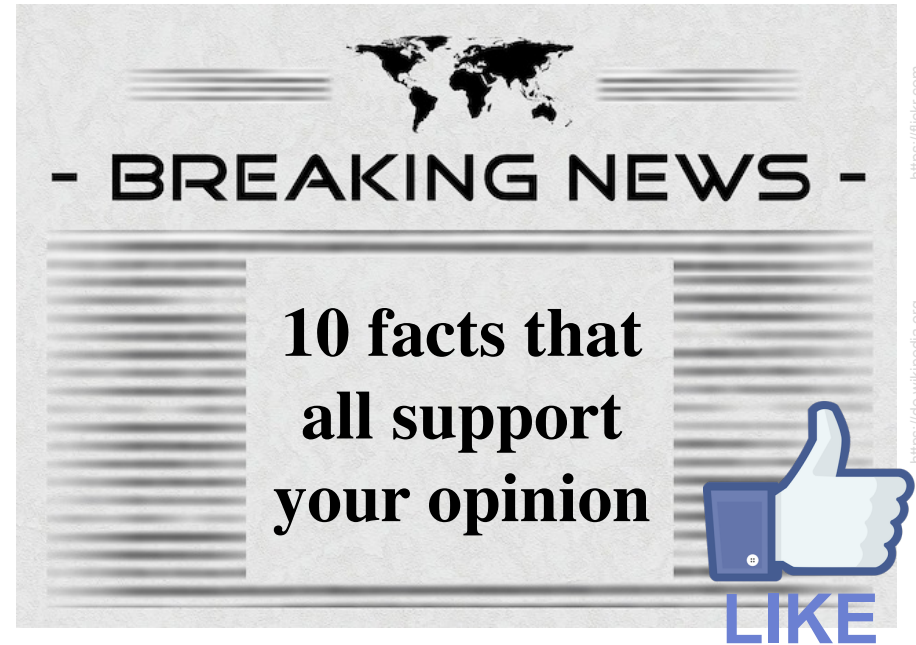
We like to get what fits our world view

Initial claim in this course

Forming opinions in a self-determined manner
is one of the great problems of our time

Where truth is unclear, we need to compare *arguments*

Can you actually persuade others with arguments?

Why do you argue on topics where persuasion is unlikely?

For what kind of topics
are you more open to arguments?

When do you form an opinion on a topic?

How do you form your opinion?

Do you think that opinion formation is self-determined?

How can we support opinion formation?

Should all views on a topic be considered?

Which arguments are most important?

Do we need computational argumentation?

Final conclusion

Conclusion

- **Argumentation**
  - Arguments along with rhetorical and dialectical aspects.
  - Used to persuade or agree with others on controversies.
  - Speakers synthesize it, listeners analyze it.
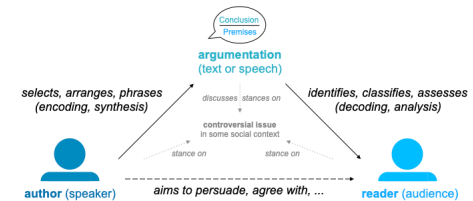
- **Computational argumentation**
  - The computational analysis and synthesis of argumentation.
  - So far, natural language processing in the focus.
  - Applications include argument search and writing support.
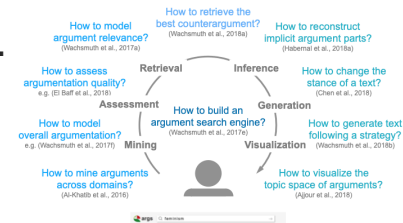
- **This course**
  - What is argumentation, why to argue, and how to argue.
  - How to analyze and synthesize argumentation computationally.
  - Why research on computational argumentation is important
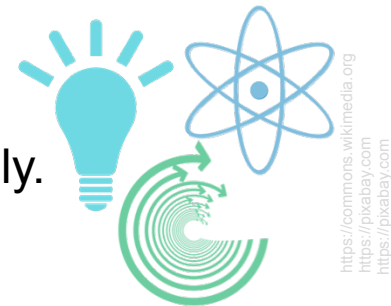
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