Computational Argumentation — Part IX

Conclusion

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Note: A number of slides received minor updates after the video recording.

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Outline

- **Argumentation (recap)**

- Computational argumentation (recap)

- *Why* computational argumentation (revisited)

- Conclusion

Why do people argue?

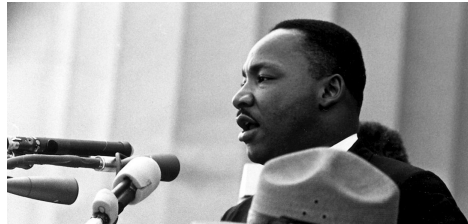- **Reasons for argumentation**
  (Freeley and Steinberg, 2009)

  - No (clearly) correct answer or solution
  - A (possible) conflict of interests or positions
  - So: Controversy

- **Goals of argumentation**
  (Tindale, 2007)

  - Persuasion
  - Agreement
  - Justification
  - Deliberation
  - Recommendation
    ... and similar

Some controversial issues

iphone vs galaxy

death penalty

skolstrejk för klimatet

sea patrols

putin

silk road

maduro

coal phase-out

affirmative action

basic income

feminism

refugees

arm exports

equal pay

social distancing

#metoo

curfews

golan heights

messi vs ronaldo

tuition fees

western arrogance

tiktok

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 EU should allow sea patrols in the Mediterranean Sea.*
Premise 1	*Many innocent refugees will die if there are no rescue boats.*
Premise 2	*Nothing justifies to endanger the life of innocent people.*

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

- **Argumentation**

  - The usage of arguments to persuade, agree, deliberate, or similar

    Conclusion
    Premises

  - Also includes rhetorical and dialectical aspects

Monological vs. dialogical argumentation

Monological argumentation

Italy, Malta, Germany, and France agreed a plan at the end of September to share responsibility for hosting asylum seekers and migrants rescued in the central Meditarranean. […]

However, the plan does not address the underlying issues with EU migration policy that have led to the increased death rate – namely the Europe-wide criminalisation of humanitarian support for asylum seekers and refugees and the EU's policy of border externalisation. […]
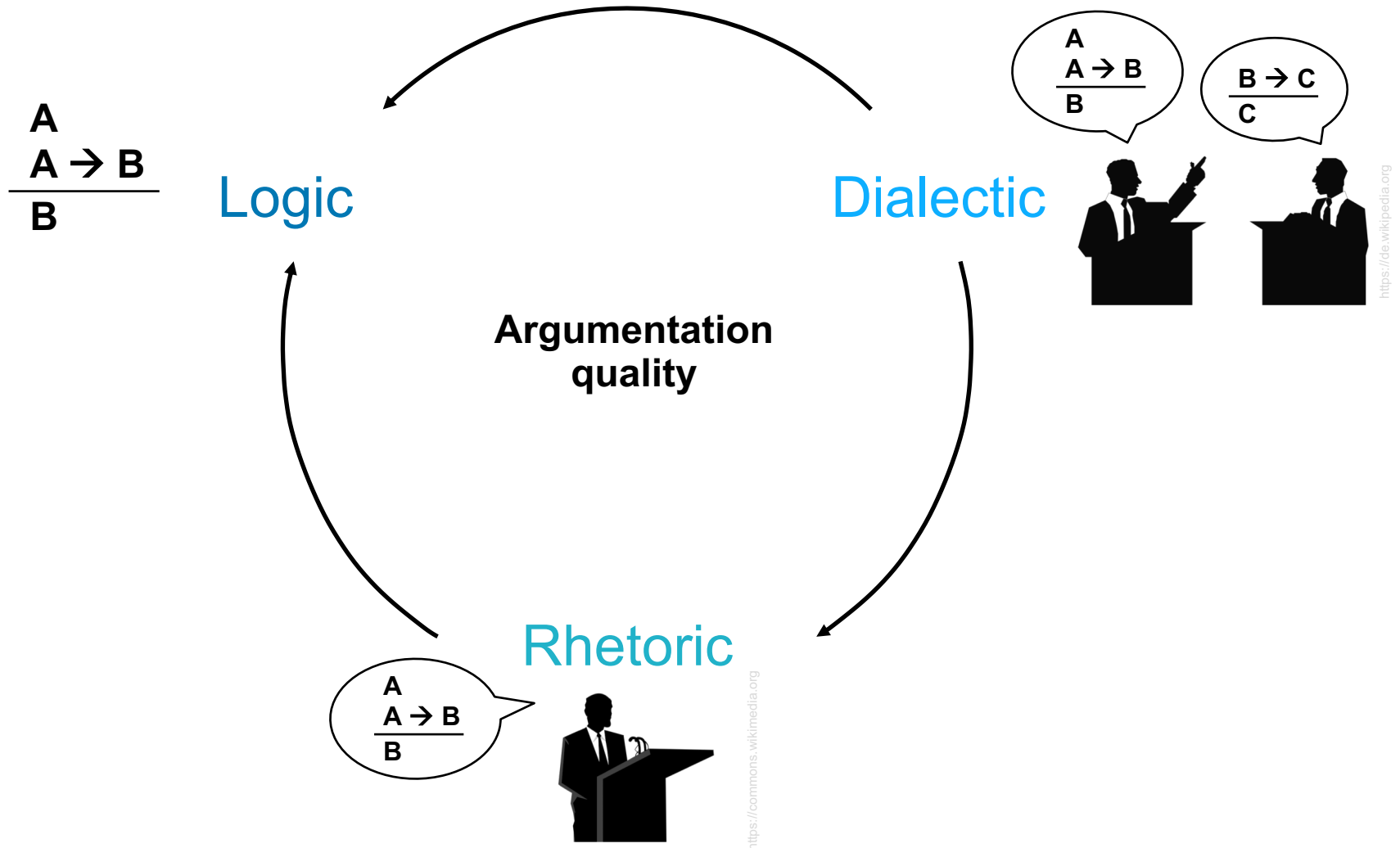
Dialogical argumentation

Alice. *The EU should allow sea patrols in the Mediterranean Sea, to save the innocent refugees.*

Bob. *So naïve… having rescue boats makes even more people die trying.*

Alice. *Well, I actually read that sea patrols haven't led to an increase yet.*

What is *good* argumentation?

Who is involved in argumentation?

Author (or speaker)

- Argumentation is connected to the person who argues.
- The same argument is perceived differently depending on the author.

" The EU should allow rescue boats. Many innocent refugees will die if there are no rescue boats."

Reader (or audience)

- Argumentation often targets a particular audience.
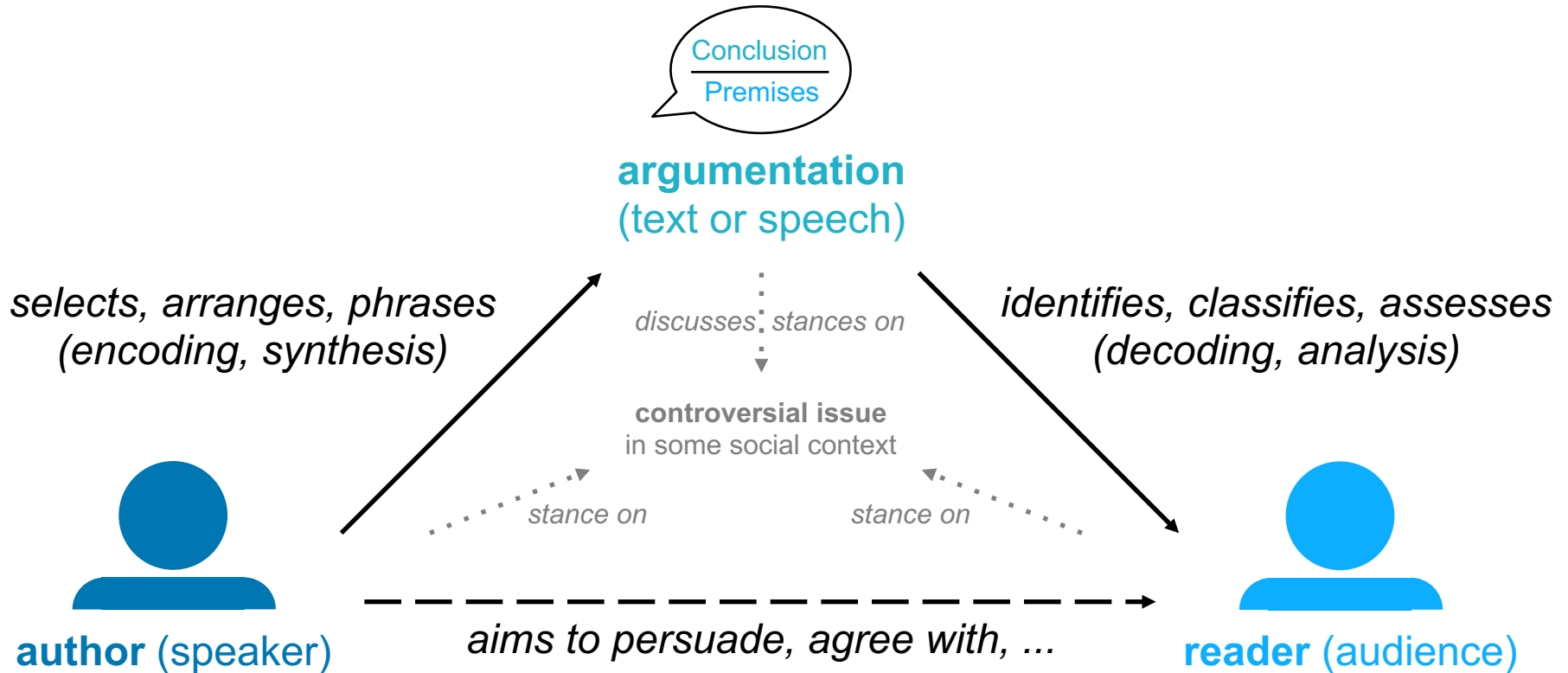- Different arguments and ways of arguing work for different readers.

" According to a recent UN study, the number of rescue boats had no effect on the number of refugees who try."

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.

Next section: Computational argumentation (recap)

I.   Introduction to computational argumentation

II. Basics of natural language processing

III. Basics of argumentation

IV. Argument acquisition

V.   Argument mining

VI. Argument assessment

VII. Argument generation

VIII. Applications of computational argumentation

IX. Conclusion

- Argumentation (recap)

- **Computational argumentation (recap)**

- *Why* computational argumentation (revisited)

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Starting point: 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
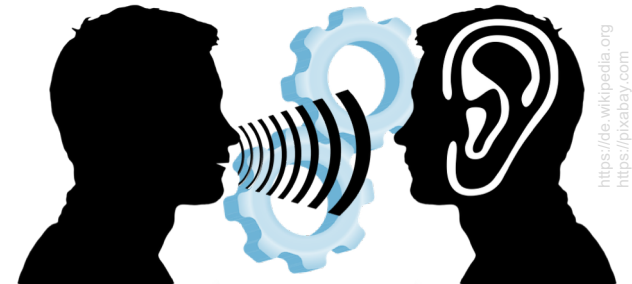
- **Revisited NLP concepts and methods**
  - Basics of linguistics and empirical methods
  - Common tasks and techniques
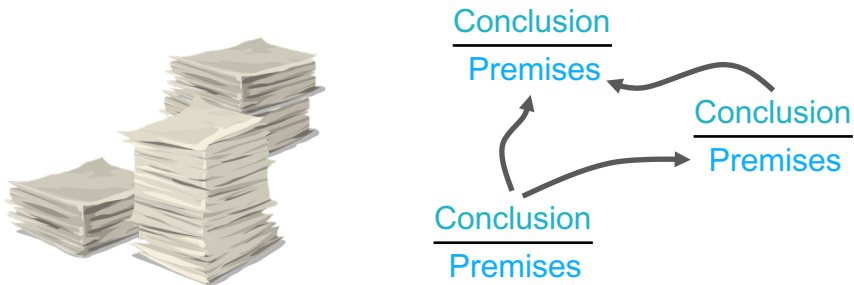 - Rule-based and statistical (machine learning) methods
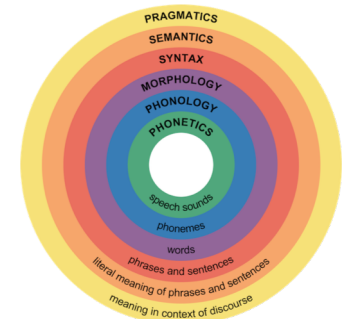
What is computational argumentation?

- **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**
    - Resources for development and evaluation
    - Models of arguments and argumentation
    - Computational methods for analysis and synthesis
   - Applications built upon the models and methods

Resources: Corpora and more

- **Corpus creation process**

  1. Text compilation. Choose the texts to be included.
  2. Annotation scheme. Define for what variables to annotate the texts.
  3. Text preprocessing. Prepare texts for annotation.
  4. Annotation sources. Decide who provides annotations.
  5. Annotation guidelines. Define how to annotate.
  6. Pilot annotation. Test the annotation process.
  7. Inter-annotator agreement. Compute how reliable the annotations are.
  8. Postprocessing. Fix errors and filter annotations.
  9. File representation. Store the annotated texts adequately.
  10. Dataset splitting. Create subsets for training and testing.

- **Existing argumentation resources**

  - Corpora annotated for argument structure, stance, quality, and similar
  - Lexicons and other representations of argumentative language
  - Online resources, including debate portals and project platforms

Models: Argumentative structure and semantics

- **Fine-grained unit roles** (Toulmin, 1958)
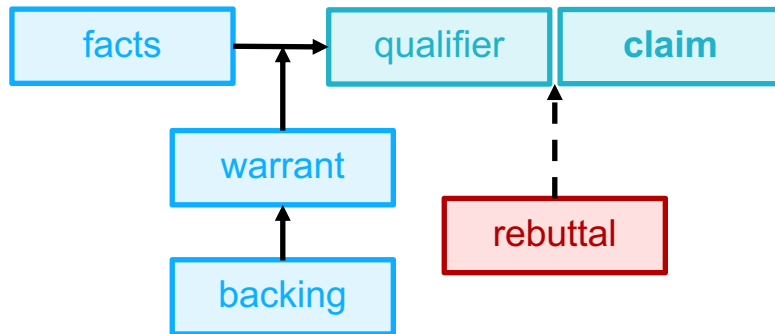
- **Inference schemes** (Walton et al., 2008)
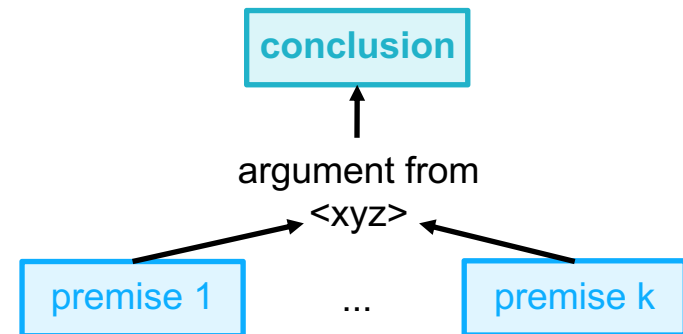
- **Dialectical exchange** (Freeman, 2011)

- **Hierarchical structure** (Stab, 2017)

Methods: Mining, assessment, and generation
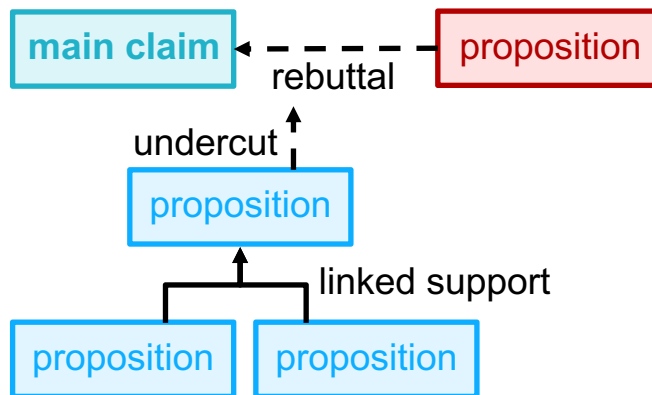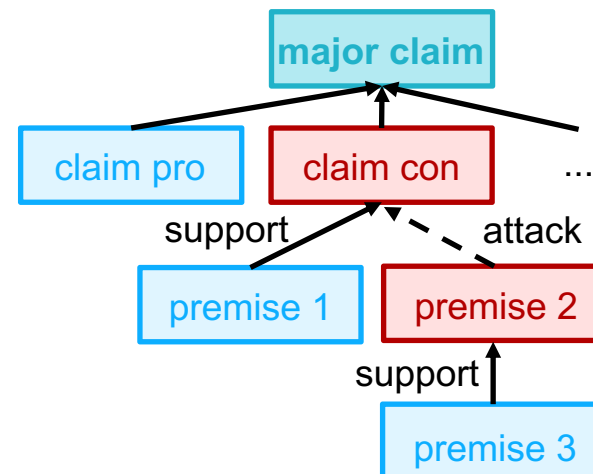
■ **Argument mining**

1. Segmenting a text into argumentative units
2. Classifying the types of units
3. Identifying relations between units or arguments
   ... along with variations of these

If you wanna hear my view, I think that the EU should allow sea patrols in the Mediterranean Sea. Many innocent refugees will die if there are no rescue boats.

■ **Argument assessment**

4. Classifying stance and myside bias
5. Classifying schemes and fallacies
6. Scoring or comparing argumentation quality
   ... along several other assessed properties

If you wanna hear my view, I think that the EU should allow sea patrols in the Mediterranean Sea. Many innocent refugees will die if there are no rescue boats. **4 / 5**

■ **Argument generation**

7. Summarizing argumentative texts
8. Synthesizing argumentative units for an issue
9. Synthesizing arguments and argumentative texts
   ... along with related non-argumentative language

Having rescue boats also may have negative effects. Even more people may die trying, believing that they may be rescued.

Applications: Search, assistance, and more

- **Argument search** (Wachsmuth et al., 2017e)

  - **What.** Find arguments on controversial issues and oppose best pro's and con's

  - **Why.** Support self-determined opinion formation

- **Decision assistance** (Slonim et al., 2021)

  - **What.** Present arguments for controversial issue and argue for a stance towards the issue

  - **Why.** Support decision making

- **Argumentative writing support** (Stab, 2017)

  - **What.** Assess quality of argumentative text and provide feedback to text

  - **Why.** Support learning of argumentative writing
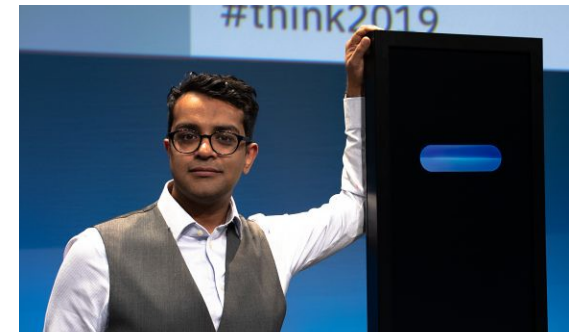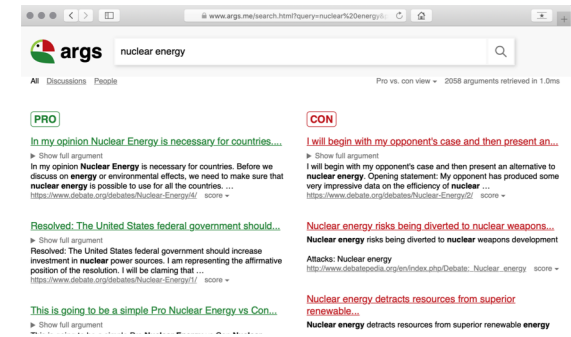
Next section: *Why* computational argumentation (revisited)

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- ***Why* computational argumentation (revisited)**

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(Our) Research on computational argumentation

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

How to integrate
argument knowledge?
(Al-Khatib et al., 2020)

How to reconstruct
implicit argument parts?
(Alshomary et al., 2020a)

How to assess
social bias in arguments?
(Spliethöver and Wachsmuth, 2020)

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

Retrieval

Inference

Assessment

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

Generation

How to model
people's ideologies?
(El Baff et al., 2020)

Mining

Visualization

How to summarize
an argument's gist?
(Alshomary et al., 2020b)

How to identify
argument frames?
(Ajjour et al., 2019)

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

args | nuclear energy 🔍

Welcome to the post-factual age!

It was January 22, 2017…   https://www.youtube.com/watch?v=VSrEEDQgFc8 (1:36 – 2:05)
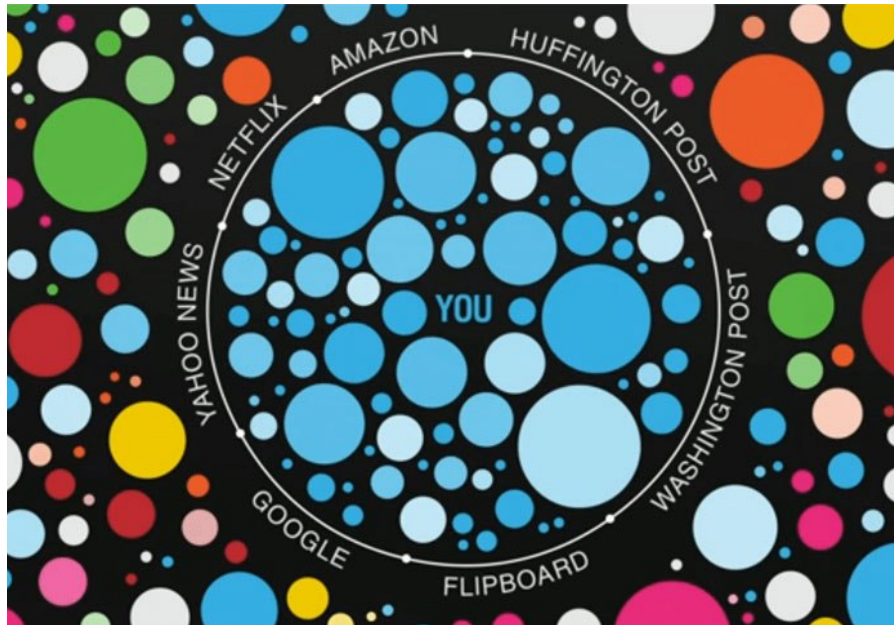
Filter bubbles and echo chambers

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*

#10

Can you actually persuade others with arguments?

Why do you argue on issues
where persuasion is unlikely?

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

When do you form an opinion on an issue?

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 an issue be considered?

Which arguments are most important?

Do we need computational argumentation?

Next section: Conclusion

- Argumentation (recap)

- Computational argumentation (recap)

- *Why* computational argumentation (revisited)
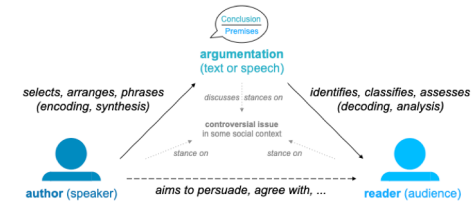
- **Conclusion**

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
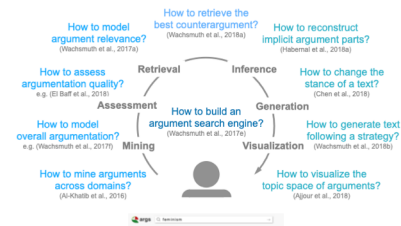
- **This course**
  - What is argumentation, why to argue, and how to argue
  - How to analyze and synthesize argumentation computationally
  - Why research on computational argumentation is important

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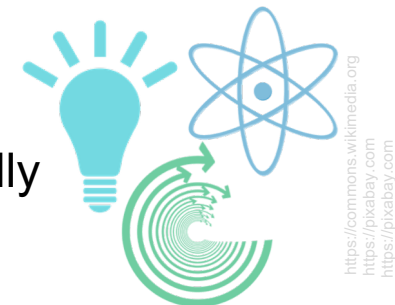- **Ajjour et al. (2018).** Yamen Ajjour, Henning Wachsmuth, Dora Kiesel, Patrick Riehmann, Fan Fan, Giuliano Castiglia, Rosemary Adejoh, Bernd Fröhlich, and Benno Stein. Visualization of the Topic Space of Argument Search Results in args.me. In Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing: System Demonstrations, pages 60–65, 2018.

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