Computational Argumentation — Part VIII

Conclusion

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Outline

I. Introduction to computational argumentation

II. Basics of natural language processing

III. Basics of argumentation

IV. Argument mining

V. Argument assessment

VI. Argument generation

VII. Applications of computational argumentation

VIII. Conclusion

- **Argumentation (recap)**
- Computational argumentation (recap)
- *Why* computational argumentation (revisited)
- Conclusion

Some controversial issues

iphone vs pixel

death penalty

skolstrejk för klimatet

rescue boats

putin

silk road

maduro

energy embargo

combustion engine

feminism

affirmative action

refugees

arm exports

equal pay

vaccine mandate

#metoo

curfews

two-state solution

messi vs ronaldo

chatgpt in education

western arrogance

tiktok

democracy

Why do people argue?

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


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- **Goals of argumentation**
  (Tindale, 2007)
  - Persuasion
  - Agreement
  - Justification
  - Deliberation

  ... and similar


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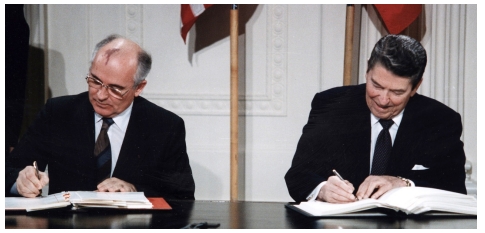
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What is argumentation?

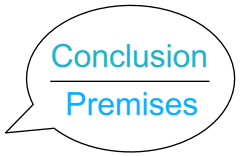
- **Argument**
  - A claim (conclusion) supported by reasons (premises) (Walton et al., 2008)
  - Conveys a stance on a controversial issue (Freeley and Steinberg, 2009)

Conclusion
Premises

Conclusion	*The EU should allow rescue boats 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
  - 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. [...]

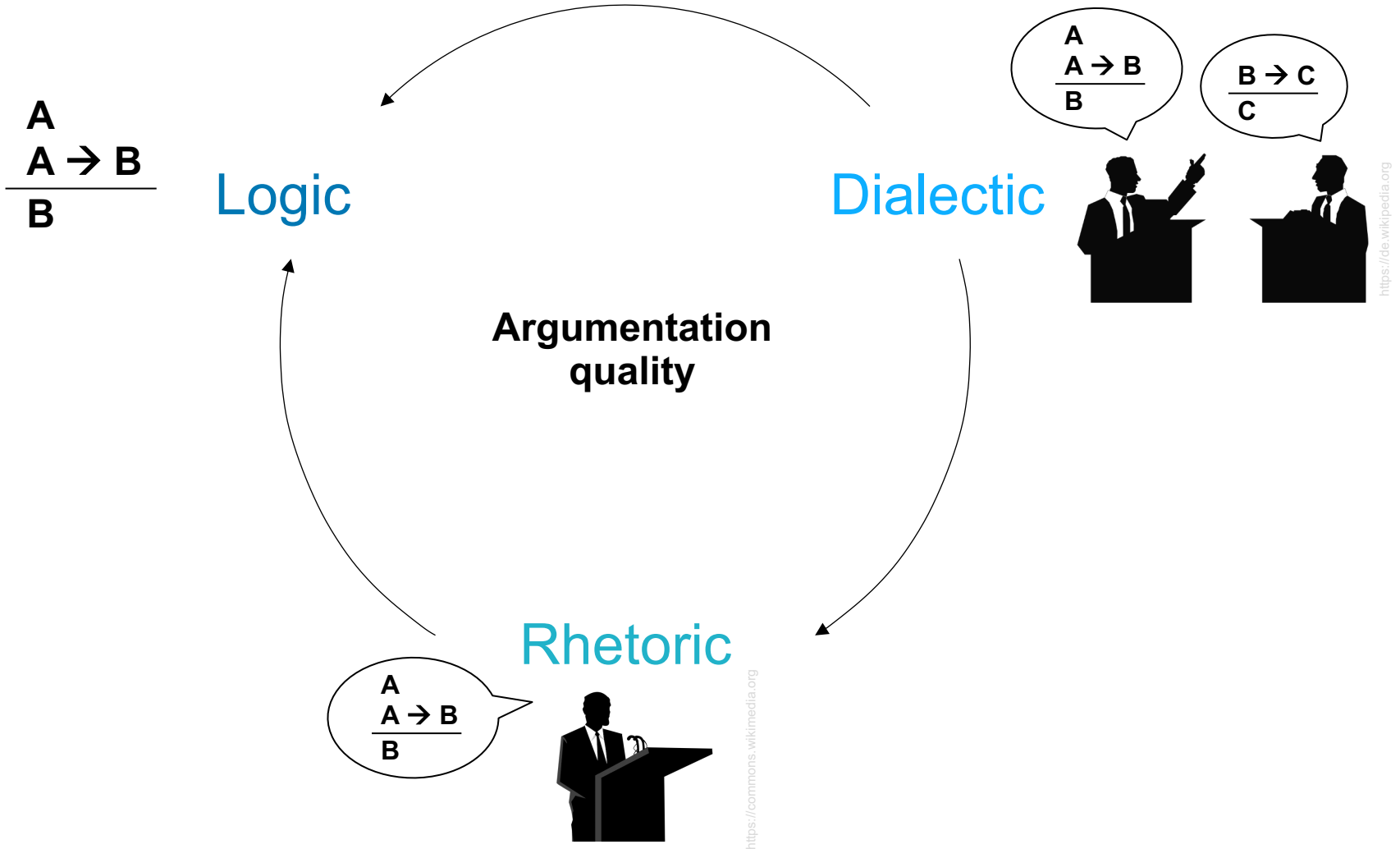
Dialogical argumentation

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

Bob. *So naïve… having such boats makes even more people die trying. I'm against.*

Alice. *Well, I actually read that rescue boats haven't led to any 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.
- **Reader (or audience)**
  - Argumentation often targets a particular audience.
  - Different arguments and ways of arguing work for different readers.

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

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

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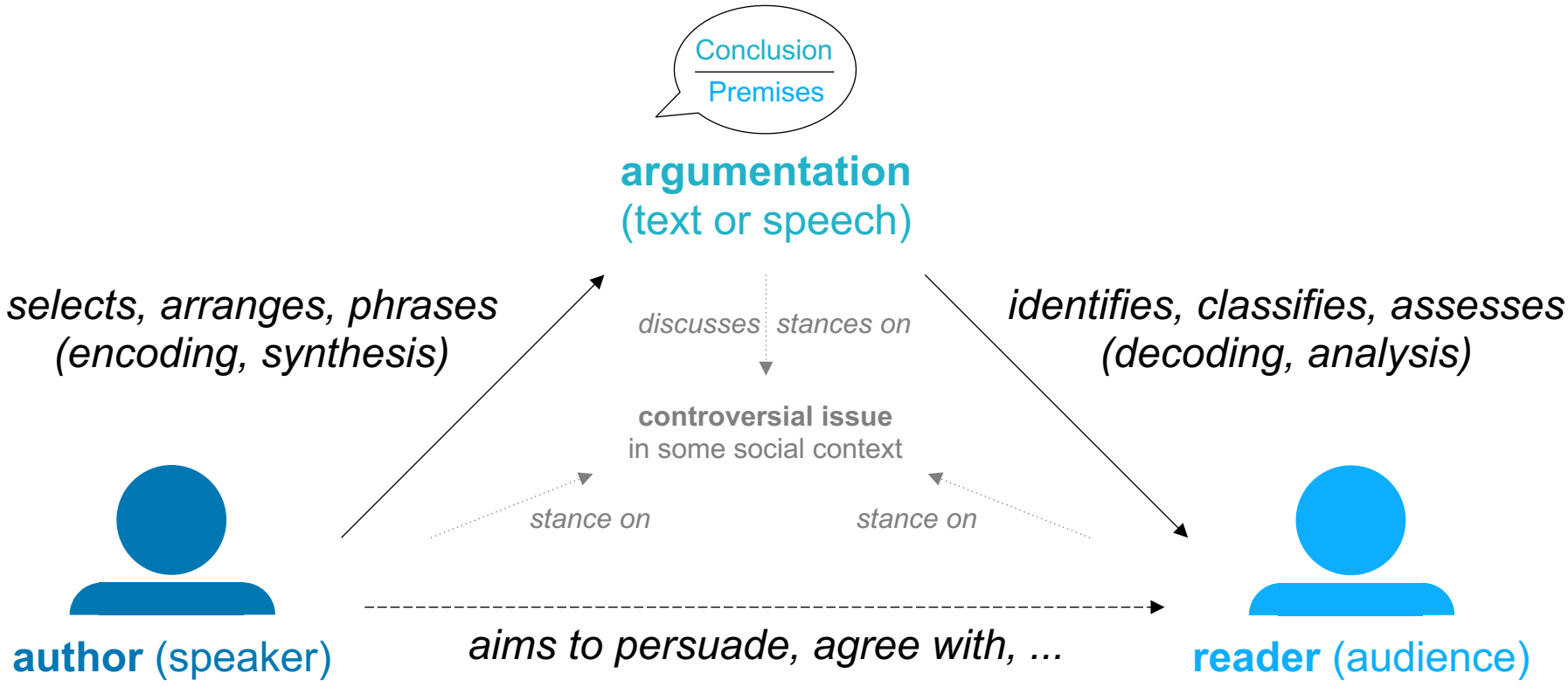
General argumentation setting



- **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)

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- **Computational argumentation (recap)**
- *Why* computational argumentation (revisited)
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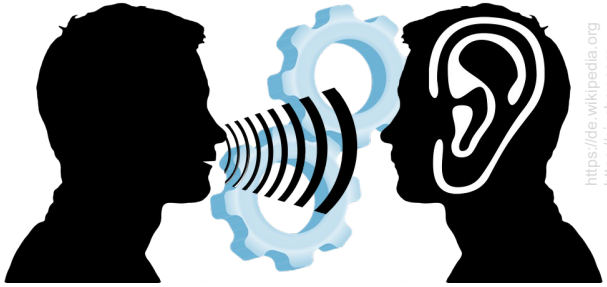
Starting point: Natural language processing

- **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



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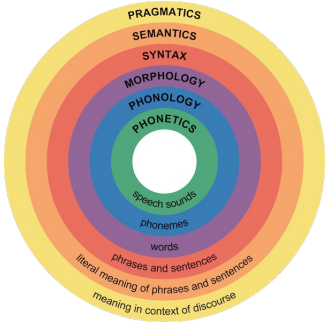
- **Revisited NLP concepts and methods**
  - Basics of linguistics and empirical methods
  - Common tasks and techniques
  - Rule-based and statistical (machine learning) methods



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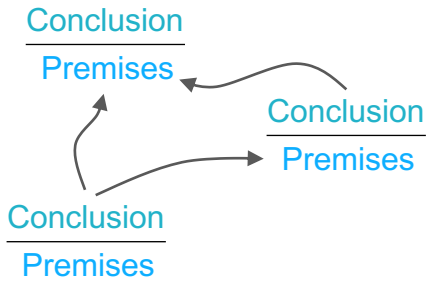
What is computational argumentation?

- **Computational argumentation**
  - The computational analysis and synthesis of natural language arguments
  - Several different tasks, usually tackled with data-driven methods

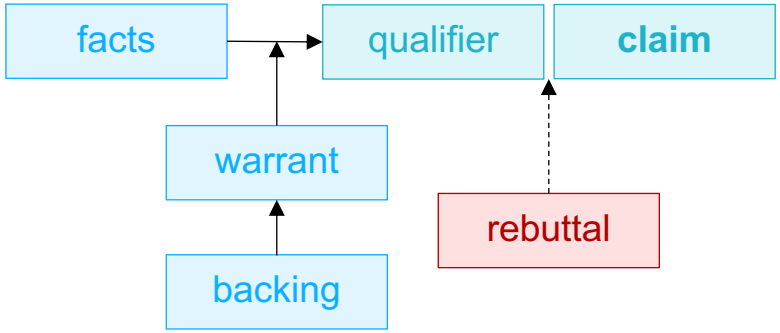


$$(1-\alpha)\cdot\frac{p(d)\cdot|D|}{|A|} + \alpha\cdot\sum_i\frac{\hat{p}(c_i)}{|P_i|}$$

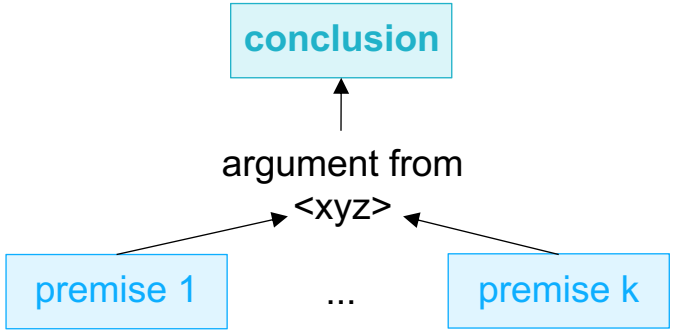
- **Main research aspects**
  - Models of arguments and argumentation
  - Computational methods for analysis and synthesis
  - Resources for development and evaluation
  - Applications built upon the models and methods

Models: Argumentative structure and semantics

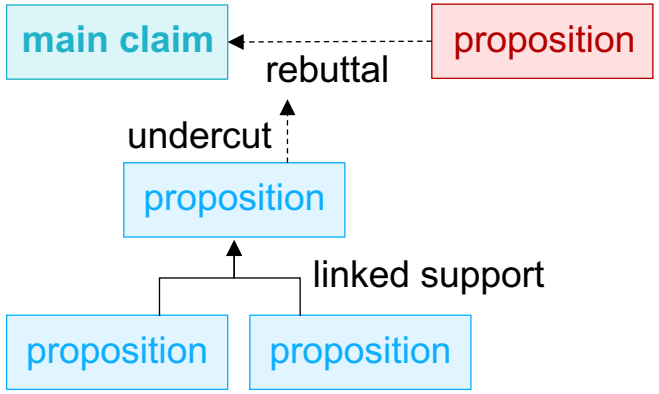
- **Fine-grained unit roles** (Toulmin, 1958)



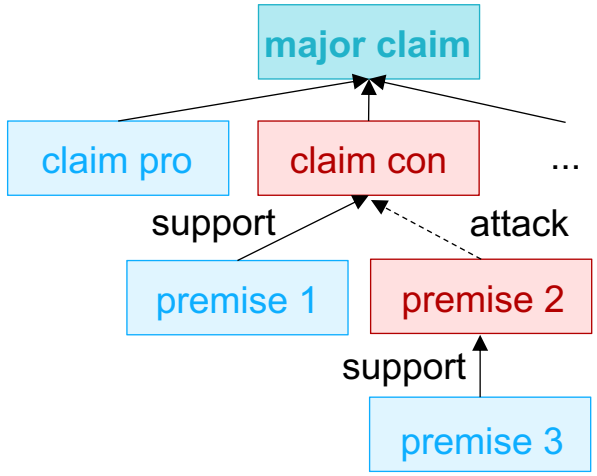
- **Inference schemes** (Walton et al., 2008)



- **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 rescue boats in the Mediterranean Sea. Many innocent refugees will die if there are no rescue boats.

- **Argument assessment**
  4. Classifying an argument‘s stance on an issue
  5. Classifying an argument‘s scheme
  6. Scoring or comparing argumentation quality

  ... along several other assessed properties

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

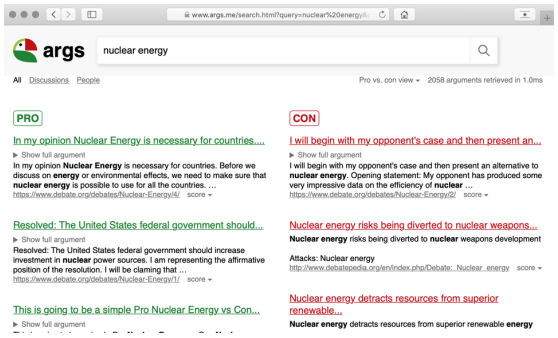
- **Argument generation**
  7. Summarizing argumentative texts
  8. Synthesizing argumentative units for an issue
  9. Synthesizing arguments and longer texts

  ... along with related non-argumentative language

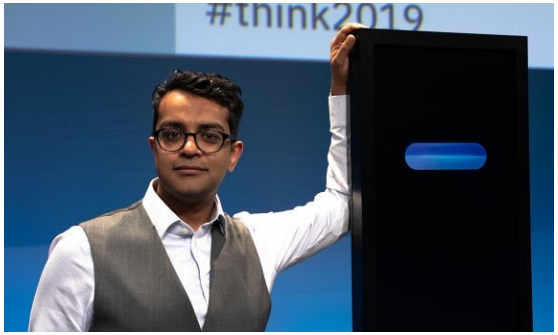
Having rescue boats also may have negative effects. Even more people may die trying, believing that they may be rescued.

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



- **Debating technology** (Slonim et al., 2021)
  - What. Present arguments for controversial issue and argue for a stance towards the issue
  - Why. Support decision making



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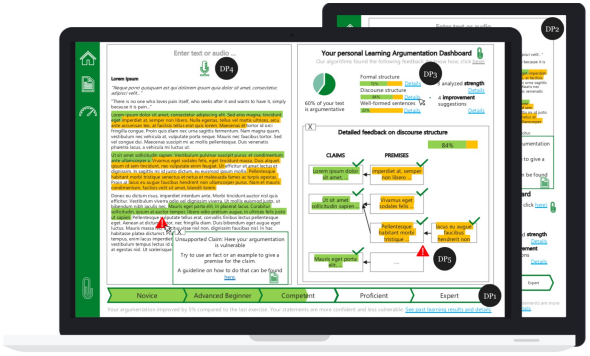
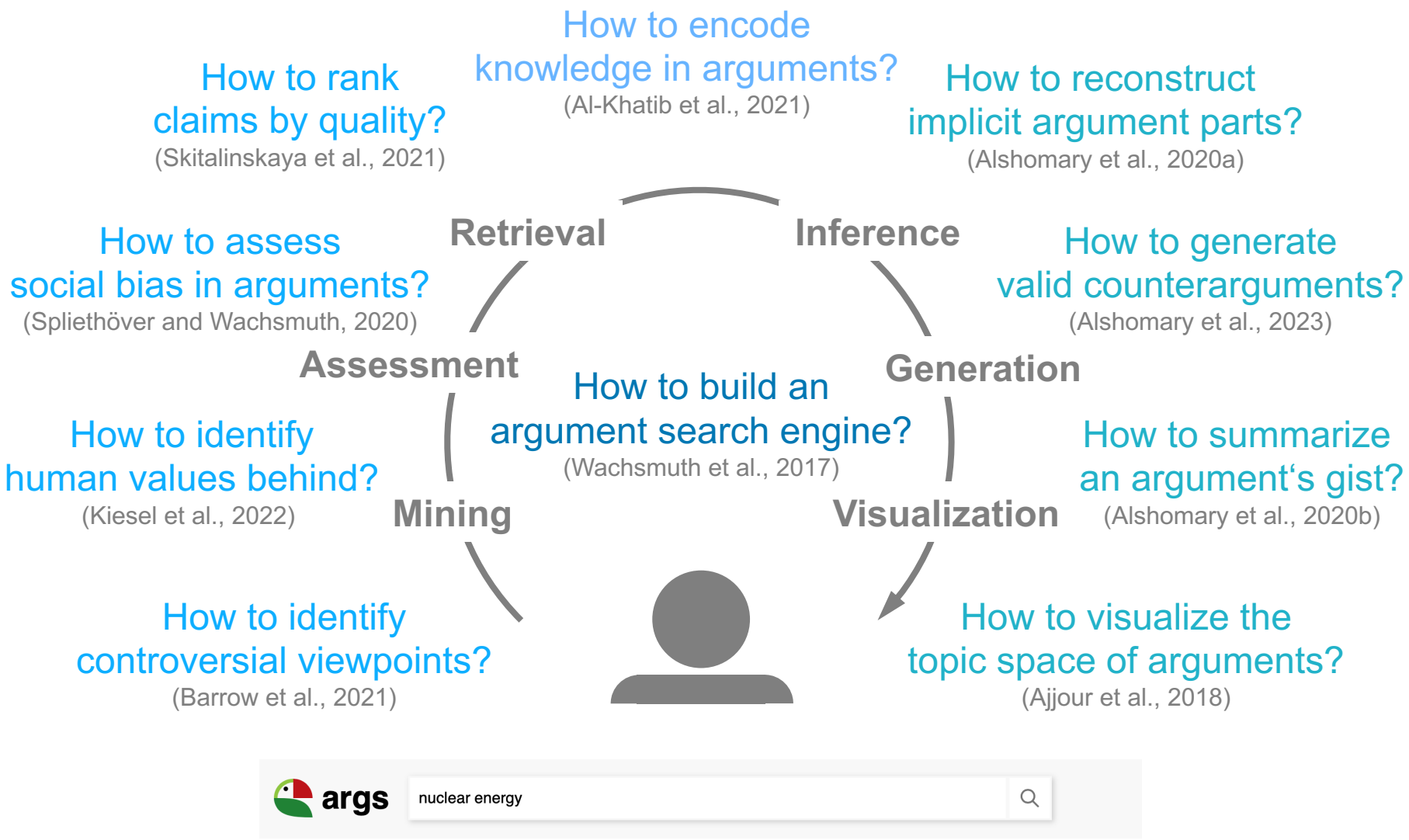
- **Argumentative writing support** (Stab, 2017)
  - What. Assess quality of argumentative text and provide feedback to text
  - Why. Support learning of argumentative writing



(Wambsganss and Rietsche, 2019)

(Our) Research on computational argumentation



Next section: *Why* computational argumentation (revisited)

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

Welcome to the post-factual age!

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

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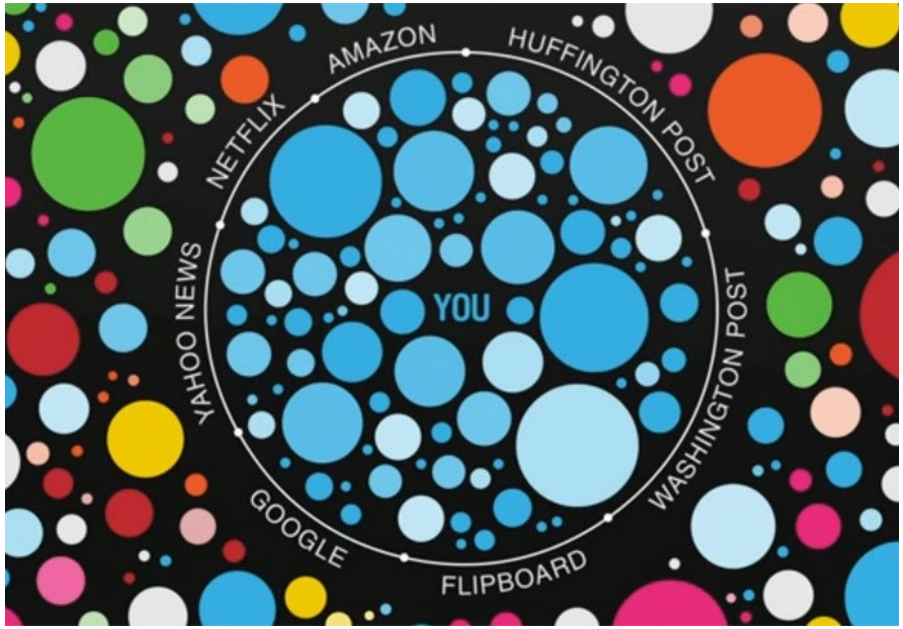
Filter bubbles and echo chambers

Filter bubbles



We get what fits our past behavior

Echo chambers

We like 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?

#9

Why do you argue on issues where persuasion is unlikely?

#8

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

#7

When do you form an opinion on an issue?

#6

How do you form your opinion?

#5

Do you think that opinion formation is self-determined?

#4

How can we support opinion formation?

#3

Should all views on an issue be considered?

#2

Which arguments are most important?

#1

Do we need computational argumentation?

Next section: Conclusion

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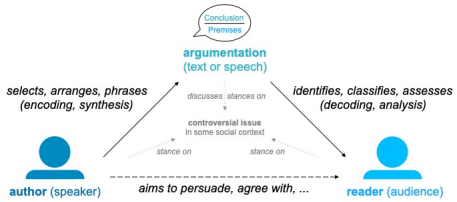
Conclusion

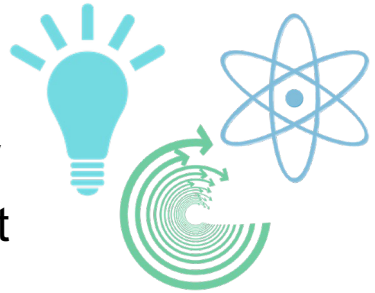
- **Argumentation**
  - Arguments along with rhetorical and dialectical aspects
  - Used to persuade or agree with others on controversies
  - Speakers synthesize it, listeners analyze it



- **Computational argumentation**
  - Computational analysis and synthesis of arguments
  - So far, natural language processing in the focus
  - Applications include search and writing support

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

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



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