



# Philosophy of Science and Computational Linguistics

Debate session

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# Outline for Today

- ▶ Short introduction and presentation of debate topics
- ▶ Smaller groups in breakout rooms: Prepare for debate (30–45 minutes)
- ▶ Debates (15 minutes per topic)
  - ▶ Each group introduces their point of view (1–2 minutes)
  - ▶ Debate among the two groups
  - ▶ Questions and comments from the audience



## Debate topics

- ▶ Is language technology a science?
- ▶ Was there an "empirical scientific revolution" in the 1990s in Kuhn's sense?
- ▶ Are individual researchers responsible for unethical use of their technology?



# Language Technology as a Science

- ▶ Is language technology science or engineering?
  - ▶ Is it a scientific goal to beat the state of the art?
  - ▶ What is the research question/hypothesis?
- ▶ If science, what is its object of study?
  - ▶ Natural language from a computational point of view (CL)
  - ▶ Computational models applied to natural language (NLP)
  - ▶ Natural language as an example of intelligent behavior (AI)
  - ▶ ...
- ▶ If engineering, how is it grounded in science?
  - ▶ Data description from linguistic theory
  - ▶ Theoretical models from mathematics and statistics
  - ▶ Algorithms from computer science
  - ▶ ...



# Science

- ▶ Characteristics of science: (Overton opinion)
  1. It is guided by natural law
  2. It has to be explanatory by reference to natural law
  3. It is testable against the empirical world
  4. Its conclusions are tentative, i.e. are not necessarily the final word
  5. It is falsifiable



# Scientific Change

- ▶ Traditional view:
  - ▶ Science advances in a cumulative fashion
- ▶ Kuhn's notion of paradigm (normal science)
  - ▶ A set of shared theoretical assumptions
  - ▶ A set of accepted problems and methods ("puzzle solving")
- ▶ Scientific revolutions
  - ▶ Accumulation of anomalies lead to crisis and revolution
  - ▶ Old paradigm abandoned only if new paradigm available
  - ▶ Copernicus, Darwin, Einstein



Thomas Kuhn  
(1922–1996)



# Language Technology Changes

- ▶ The “empirical revolution” in language technology
  - ▶ Before 1990: Rationalist approaches and qualitative evaluation
  - ▶ Today: Empirical approaches and quantitative evaluation
- ▶ What happened?
  - ▶ Paradigm shift in Kuhn's sense?
  - ▶ Just another swing of the pendulum?
  - ▶ Language technology becoming a mature science?
  - ▶ ...



# Language Technology Changes

- ▶ The “empirical revolution” in language technology
  - ▶ Before 1990: Rationalist approaches and qualitative evaluation
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  - ▶ ...
- ▶ You may also consider the “neural” revolution around 2015





## Dual use issues

- ▶ The outcome of research can often be used both for good and bad
  - ▶ Author identification: identify the provenance of historical documents versus endanger anonymity of political dissenters
  - ▶ Fake news: possibility to identify versus possibility to generate
- ▶ Research funding by military sources are common
- ▶ Where do the responsibility of the individual researcher start?
  - ▶ Avoid sensitive research areas?
  - ▶ Acknowledge issues and raise awareness?
  - ▶ The responsibility need to be taken at other levels?
  - ▶ ...



## Debate topics

- ▶ Is language technology a science?
  - ▶ Group 1: yes
  - ▶ Group 2: no
- ▶ Was there an "empirical scientific revolution" in the 1990s in Kuhn's sense?
  - ▶ Group 3: yes
  - ▶ Group 4: no
- ▶ Are individual researchers responsible for unethical use of their technology?
  - ▶ Group 5: yes
  - ▶ Group 6: no



## Coming up

- ▶ First literature seminar, Friday 10 or Tuesday 14
  - ▶ Check on the web page if you will present an article at the first seminar
  - ▶ All students read all articles
- ▶ Take home exam
  - ▶ Handed out: September 8 (morning) in Studium
  - ▶ Hand in: September 16, 23.59 in Studium
  - ▶ Anonymous