How to Write a Scientific Work?

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The slides were created by Pascal Bercher (The Australian National University, ANU) while still at the Institute of Artificial Intelligence, Ulm University, Germany. He later translated it to English when at ANU. Some of the content was originally created by Gregor Behnke, Daniel Höller, and Thomas Geier (all colleagues from the AI Institute at Ulm University), but then extended significantly by Pascal.

Excursion: Typical Mistakes

- Wrong article: The *definite* article may **only** be used if the respective object is already known or is being introduced right now
  - "The state $s \in S$ is a goal state." (wrong)
  - "Let $(..., s, ...)$ be given. The state s is a goal state if ... holds." (correct)
  - "A state $s \in S$ is a goal state if ... holds." (correct)
- Quotation marks:
  - Eng: "quotation marks" are both on top (66/99),
  - Eng: LaTeX command: ``...'' (4 characters, no package needed).

Citation Style

Do not use citations as objects in your sentences! Use a citation in parentheses behind a proposition to back it up (without using it as object of the sentence) or use an author (without parentheses) as an object of your sentence.

- Wrong: "[...], as shown in (Bercher et al. 2019)." If one interprets "(Bercher et al. 2019)" the the paper it refers to, then this sentence is technically not wrong, but it is still a bad style.
- Wrong: "[...], as shown in Bercher et al. (2019)." Wrong because *in the person* Bercher surely nothing was shown!
- Correct: "[...], as shown by Bercher et al. (2019)."
- Correct: "[...], as it is commonly known (Bercher et al., 2019)"

Citations with LaTeX

Use *bibtex* or *biber*! How?

- There are countless tutorials and help files. Search for it!
- See also our example work.

Citations with LaTeX (cont'd)

- Always provide *page numbers* and *publisher* (on top of the title and authors, of course).
- The data/information of different publications should be *consistent*. Examples for conference titles:
  - "Proceedings of the 24th International Conference on Automated Planning and Scheduling (ICAPS 2014)" versus:
  - "Proc. of the 2013 IEEE 25th Int. Conf. on Tools with Artificial Intelligence"
- Reduce such inconsistent abbreviations (i.e., "Proceedings" vs "Proc.")
- Either always add abbreviations of conferences or never (i.e., delete "(ICAPS 2014)" or add "(ICTAI 2013)").
- See also our example work.

Further LaTeX Hints

- There are different kinds of dashes
  - hyphen: - (LaTeX: -)
  - dash: – (LaTeX: --)
  - long dash: — (LaTeX: ---)
- Prevent line breaks:
  - between any group of words: \mbox{Word1 Word2 Word3}
  - exactly at the space: Word1~Word2

Exemplary Table of Contents

- (Also compare with scientific papers!)
- Abstract.
  - Essentially it is an abstraction of the introduction, i.e., a motivating summary.
  - In contrast to the introduction, it does not contain related work and it is much less "introducing" the topic.
- Introduction.
  - Introduces the general topic.
  - Motivation (why is it interesting and relevant?)
  - Mention related work (even if there is a dedicated related work section).
- Basics (or Formal Framework)
  - This section introduces the basic formalisms that are essential for the remainder of the thesis.
  - It should only introduce formalisms that will be used later on and only on a technical level that will be required.

Exemplary Table of Contents (cont'd)

- Main Content
  - This is usually between 1 and 3 sections with well-chosen titles.
- Related work.
  - This should discuss related work in detail.
  - Optional. Depends on the respective content. It should only be used if some works require a detailed discussion wrt the proposed contributions.
- Discussion
  - Optional. Depends on the respective contributions.

  - A discussion is rather rare and makes sense if the respective contribution can or should be interpreted or to hypothesize about possible implications or future work.
  - Instead of having an entire section, parts of it could also be added to the conclusion instead.
- Conclusion:
  - This is essentially very short summary of the achieved results.