Master Your Thesis!

Thesis Preparation Workshop

TUM Faculty of Informatics

SS 2024

Session 3

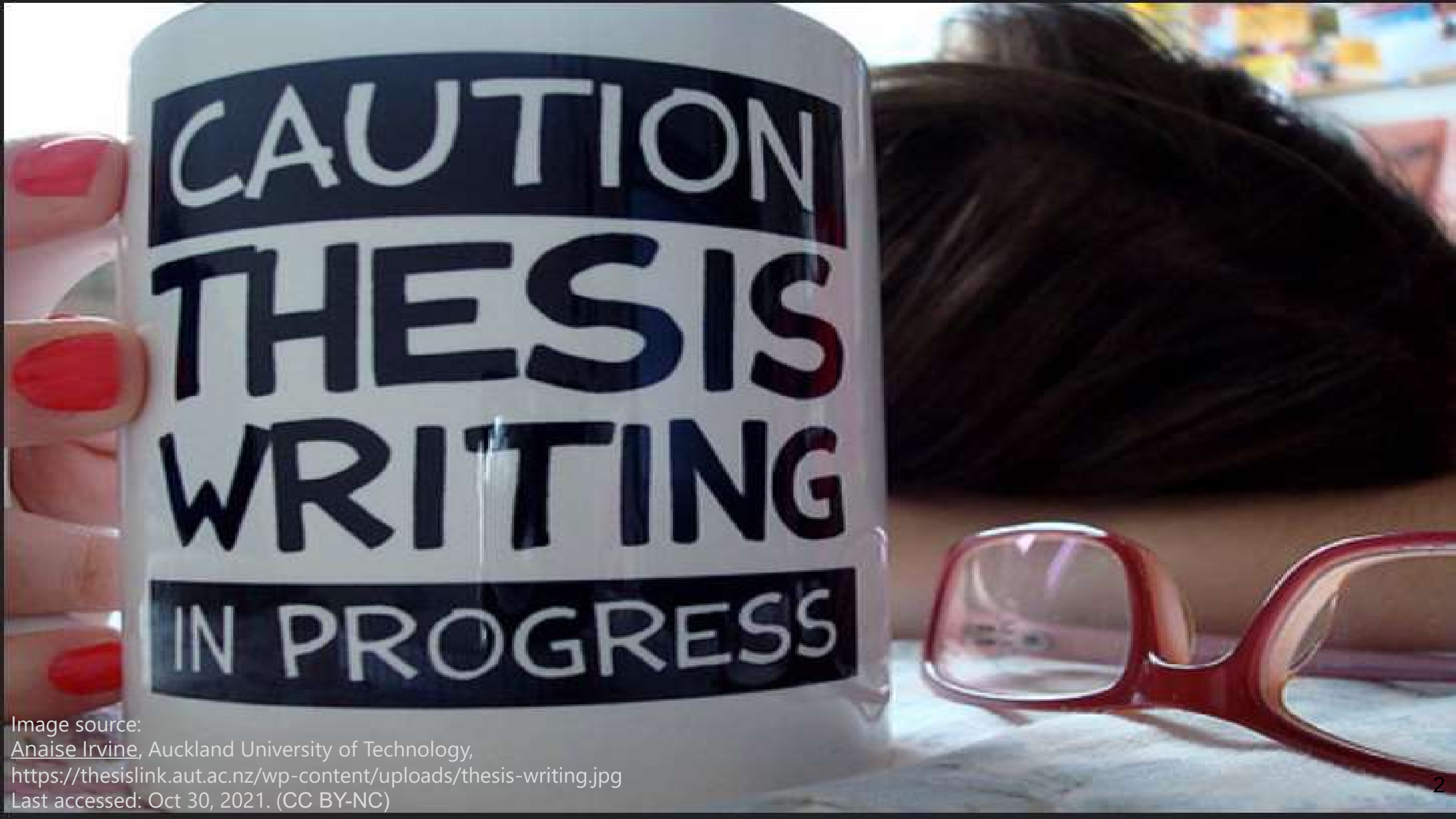


Image source:
Anaise Irvine, Auckland University of Technology,
https://thesislink.aut.ac.nz/wp-content/uploads/thesis-writing.jpg
Last accessed: Oct 30, 2021. (CC BY-NC)

MASTER YOUR THESIS: KEY DATES

April
Friday
26

Kick-off

Organizational matters. Status analysis.
Specification of needs and goals. Master's Thesis writing as a project.
Writer's block. Outlining rules.

May
Friday
03

Writing the Thesis Proposal

Feedback to outlines. and self- reflections.
Requirements for MTh and for written proposals.
Sections of proposals. Focus : Introduction, conclusions, title.

June
Friday
07

Effective Scientific Presentations

Abstract writing. Telling your story. Visual communication.
Debriefing of the workshop. Matching achievements against envisioned goals. Assessment of group work.

July
Friday
05

Oral Presentations (immanent examination)

Pre-proposal presentations with peer feedback.

'Good text is like
a piece of fine engineering:
it does the job it is designed to do;
each element complements every other,
nothing is heavier or more complex than it
need be—and the end result is pleasing
to both the senses and the intellect.'

(An essay on text, 1991
by John Levett, Librarian, Melbourne)

Norms, Standards, and Recommended Practices

American National Standards Institute (ANSI)
Scientific and Technical Reports – Preparation, Presentation and Preservation.
ANSI/NISO Z39.18-2005. **ISBN: 1-880124-66-1**

American National Standards Institute (ANSI)
American National Standard for Writing Abstracts
New York: ANSI 2010.
Latest revision of ANSI/NISO Z39.14-1997 (R2010)

International Committee of Medical Journal Editors (ICMJE):
Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publications
Vancouver, Updated April 2010

European Association of Science Editors (EASE):
Guidelines for Authors and Translators of Scientific Articles to be Published in English
London, June 2010

IEEE Editorial Style Manual for Authors
Piscataway, NJ, 2019
Latest version: V 07.10.19

DIN 1426: Inhaltsangaben von Dokumenten; Kurzreferate, Literaturberichte. 1988-10.

ISO 214:1976 (STANDARD CONFIRMED 02/2011)

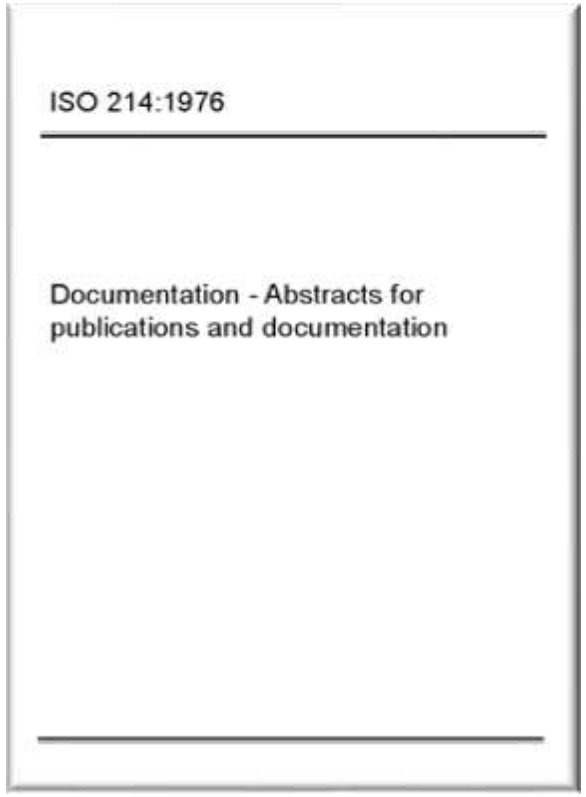
- defines an abstract as
  - *"an abbreviated, accurate representation of the contents of a document"*

  that should
  - *"enable readers to identify the basic content of a document quickly and accurately to determine relevance".*
- suggests including the following elements:
  purpose, methods, results, and conclusions.

WHAT NORMS SAY:

An abstract is

- A text paragraph with condensed information without any interpretation and evaluation.
- Independent of the text, a stand-alone text type.
- An explanatory complement to the title.
- Complete with five basic statements:
  - Topic/Background/Problem/Rationale
  - Purpose
  - Methodology
  - Results
  - Implications
- A mirror of the contextual structure of the paper.
- Free of references and citations
- Careful about using acronyms; if any, only with the full form.
  (Exceptions: - Commonly accepted acronyms
  - Chemical formulae)



Colour-Coded Structured Abstract

Rationale: *The abstract of a thesis is of prominent importance as it provides a brief summary of the thesis.*

Problem: *However, many theses have ill-structured abstracts. This hinders effective research of literature and makes the content of the theses difficult to access.*

Objective: *Academics should learn at an early stage of their carriers how to write abstracts according to the norm.*

Methods: *Today we look at the features of well-written abstracts.*

Contributions: *We present a generally accepted abstract structure, analyse abstracts of different quality, and give practical guidelines for abstract writing.*

Conclusion: *The participants can immediately employ this information to write better readable abstracts in future.*

(106 words)

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Academics should learn at an early stage of their carriers how to write abstracts according to the norm.

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The participants can immediately employ this information to write better readable abstracts in future.

(100words)

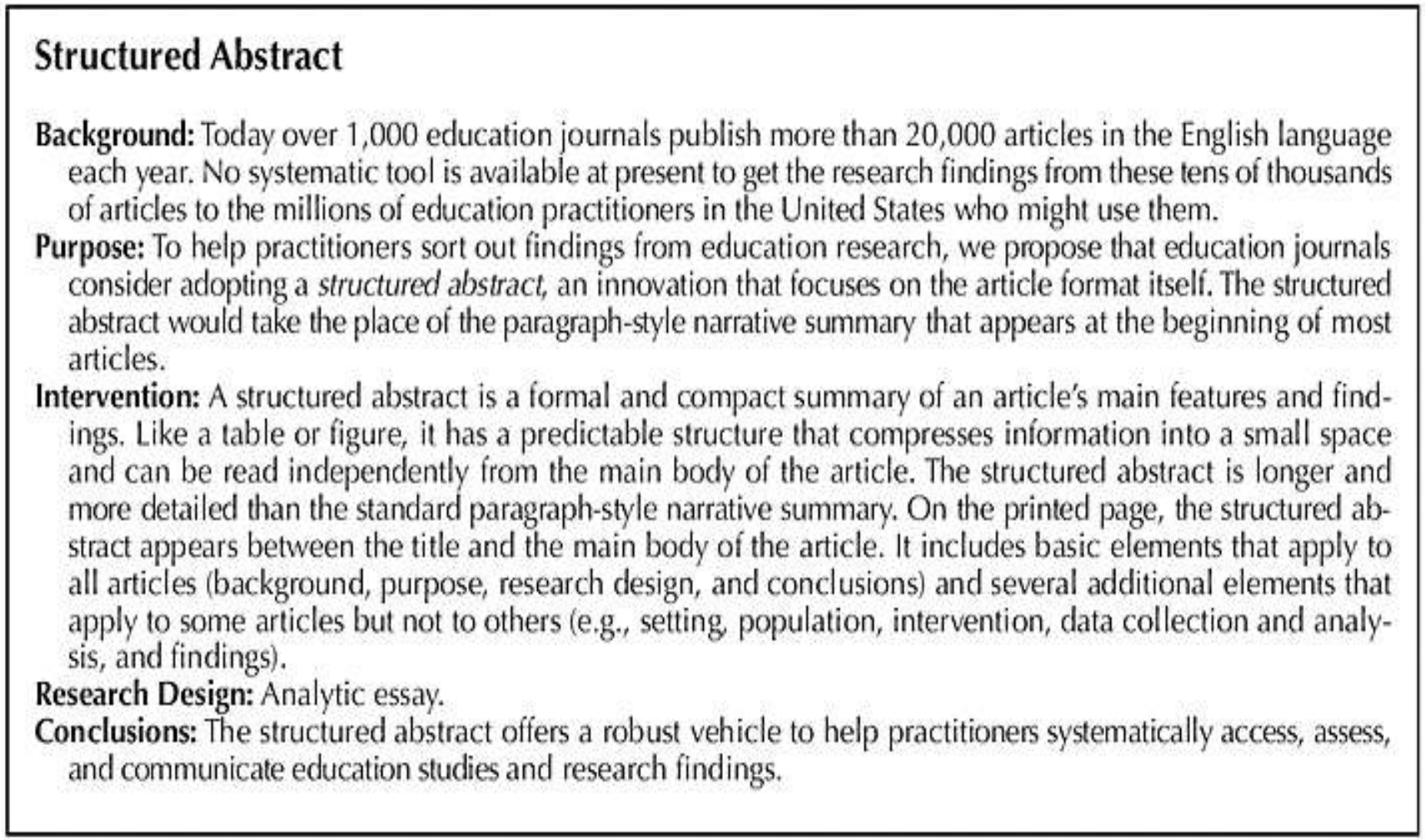
Miech, E. J., Nave, B., & Mosteller, F. (2005).

The 20,000 article problem: How a structured abstract can help practitioners sort out educational research.

Phi Delta Kappan, *86*(5), 396-400.

https://www.jstor.org/stable/20441793.

Last accessed: 2024.06.06.



Structured Abstract

Background: Today over 1,000 education journals publish more than 20,000 articles in the English language each year. No systematic tool is available at present to get the research findings from these tens of thousands of articles to the millions of education practitioners in the United States who might use them.

Purpose: To help practitioners sort out findings from education research, we propose that education journals consider adopting a *structured abstract,* an innovation that focuses on the article format itself. The structured abstract would take the place of the paragraph-style narrative summary that appears at the beginning of most articles.

Intervention: A structured abstract is a formal and compact summary of an article's main features and findings. Like a table or figure, it has a predictable structure that compresses information into a small space and can be read independently from the main body of the article. The structured abstract is longer and more detailed than the standard paragraph-style narrative summary. On the printed page, the structured abstract appears between the title and the main body of the article. It includes basic elements that apply to all articles (background, purpose, research design, and conclusions) and several additional elements that apply to some articles but not to others (e.g., setting, population, intervention, data collection and analysis, and findings).

Research Design: Analytic essay.

Conclusions: The structured abstract offers a robust vehicle to help practitioners systematically access, assess, and communicate education studies and research findings.

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The 20,000 article problem: How a structured abstract can help practitioners sort out educational research.

Phi Delta Kappan, *86*(5), 396-400.

https://www.jstor.org/stable/20441793.

Last accessed: 2024.06.06.

Figure 1. A Template for a Structured Abstract

Background/Context: Description of prior research on the subject and/or its intellectual context and/or its policy context.

Purpose/Objective/Research Question/Focus of Study: Description of what the research focused on and/or why.

Setting: Specific description of where the research took place or was focused.

Population/Participants/Subjects: Description of the participants in the study: who, what, how many, and other key features.

Intervention/Program/Practice: Specific description of the intervention, including what it was, how it was administered, and its duration.

Research Design: Description of the kind of research design (e.g., qualitative case study, quasi-experiment, secondary analysis, analytic essay, randomized controlled field trial).

Data Collection and Analysis: Description of plan for collecting and analyzing data, including description of data.

Findings/Results: Description of main findings with specific details.

Conclusions/Recommendations: Description of conclusions and recommendations of author(s), based on the findings.

Abstract = The Second Most Frequently Read Part

Answer the questions :

Why did you study the problem?

Motivation/Objective

What problem are you trying to solve?

Problem statement

What have you done?

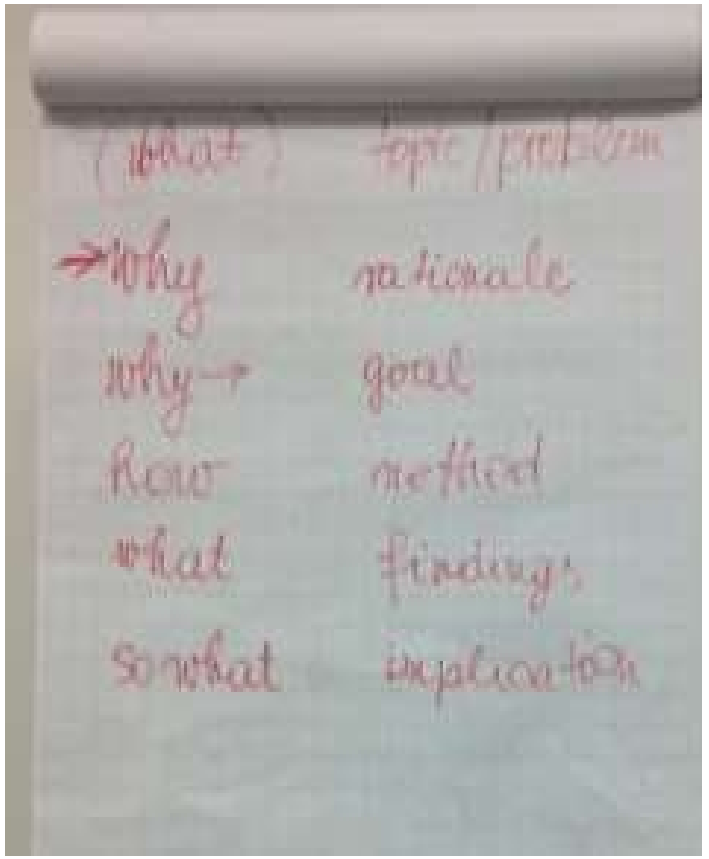
Approach

What have you found?

Results

What are your conclusions? /**So what?**

Conclusions /Implications



Abstract = Quintessence of the paper, but not more.

WINNING ABSTRACTS

1. Rationale
2. Objective
3. Materials and methods
4. Results
5. Implications

SAMPLE ABSTRACTS

International Journal of Computer Vision
https://doi.org/10.1007/s11263-018-1122-2

Learning to Segment Moving Objects

Pavel Tokmakov[1] · Cordelia Schmid[2] · Karteek Alahari[2]

Received: 2 December 2017 / Accepted: 10 September 2018

Abstract

We study the problem of segmenting moving objects in unconstrained videos. Given a video, the task is to segment all the objects that exhibit independent motion in at least one frame. We formulate this as a learning problem and design our framework with three cues: (1) independent object motion between a pair of frames, which complements object recognition, (2) object appearance, which helps to correct errors in motion estimation, and (3) temporal consistency, which imposes additional constraints on the segmentation. The framework is a two-stream neural network with an explicit memory module. The two streams encode appearance and motion cues in a video sequence respectively, while the memory module captures the evolution of objects over time, exploiting the temporal consistency. The motion stream is a convolutional neural network trained on synthetic videos to segment independently moving objects in the optical flow field. The module to build a "visual memory" in video, i.e., a joint representation of all the video frames, is realized with a convolutional recurrent unit learned from a small number of training video sequences. For every pixel in a frame of a test video, our approach assigns an object or background label based on the learned spatio-temporal features as well as the "visual memory" specific to the video. We evaluate our method extensively on three benchmarks, DAVIS, Freiburg-Berkeley motion segmentation dataset and SegTrack. In addition, we provide an extensive ablation study to investigate both the choice of the training data and the influence of each component in the proposed framework.

SAMPLE ABSTRACTS

Proceedings of Machine Learning Research 81:1–15, 2018 Conference on Fairness, Accountability, and Transparency

Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification*

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MIT Media Lab 75 Amherst St. Cambridge, MA 02139

Timnit Gebru TIMNIT.GEBRU@MICROSOFT.COM
Microsoft Research 641 Avenue of the Americas, New York, NY 10011

Editors: Sorelle A. Friedler and Christo Wilson

Abstract

Recent studies demonstrate that machine learning algorithms can discriminate based on classes like race and gender. In this work, we present an approach to evaluate bias present in automated facial analysis algorithms and datasets with respect to phenotypic subgroups. Using the dermatologist approved Fitzpatrick Skin Type classification system, we characterize the gender and skin type distribution of two facial analysis benchmarks, IJB-A and Adience. We find that these datasets are overwhelmingly composed of lighter-skinned subjects (79.6% for IJB-A and 86.2% for Adience) and introduce a new facial analysis dataset which is balanced by gender and skin type. We evaluate 3 commercial gender classification systems using our dataset and show that darker-skinned females are the most misclassified group (with error rates of up to 34.7%). The maximum error rate for lighter-skinned males is 0.8%. The substantial disparities in the accuracy of classifying darker females, lighter females, darker males, and lighter males in gender classification systems require urgent attention if commercial companies are to build genuinely fair, transparent and accountable facial analysis algorithms.

Keywords: Computer Vision, Algorithmic Audit, Gender Classification

who is hired, fired, granted a loan, or how long an individual spends in prison, decisions that have traditionally been performed by humans are rapidly made by algorithms (O'Neil, 2017; Citron and Pasquale, 2014). Even AI-based technologies that are not specifically trained to perform high-stakes tasks (such as determining how long someone spends in prison) can be used in a pipeline that performs such tasks. For example, while face recognition software by itself should not be trained to determine the fate of an individual in the criminal justice system, it is very likely that such software is used to identify suspects. Thus, an error in the output of a face recognition algorithm used as input for other tasks can have serious consequences. For example, someone could be wrongfully accused of a crime based on erroneous but confident misidentification of the perpetrator from security video footage analysis.

Many AI systems, e.g. face recognition tools, rely on machine learning algorithms that are trained with labeled data. It has recently been shown that algorithms trained with biased data have resulted in algorithmic discrimination (Bolukbasi et al., 2016; Caliskan et al., 2017). Bolukbasi et al. even showed that the popular word embedding space, Word2Vec, encodes societal gender biases. The authors used Word2Vec to train an analogy generator that fills in miss-

SAMPLE ABSTRACTS

Doodle Around the World: Online Scheduling Behavior Reflects Cultural Differences in Time Perception and Group Decision-Making

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ABSTRACT

Event scheduling is a group decision-making process in which social dynamics influence people's choices and the overall outcome. As a result, scheduling is not simply a matter of finding a mutually agreeable time, but a process that is shaped by social norms and values, which can highly vary between countries. To investigate the influence of national culture on people's scheduling behavior we analyzed more than 1.5 million Doodle date/time polls from 211 countries. We found strong correlations between characteristics of national culture and several behavioral phenomena, such as that poll participants from collectivist countries respond earlier, agree to fewer options but find more consensus than predominantly individualist societies. Our study provides empirical evidence of behavioral differences in group decision-making and time perception with implications for cross-cultural collaborative work.

What, for example, if participants do not make themselves available whenever they could in order to avoid making a temporary commitment for these times? What if they indicate availability for less convenient options just because they do not want to inhibit finding a mutually agreeable time? And what if they do so because of social norms and procedures that influence their behavior?

We see event scheduling as a group decision-making process [13] in which "a set of individual preferences are transformed into a group choice by a certain social procedure" [22]. Researchers have observed that societal norms and values differ between countries and determine how groups negotiate individual choices and reach consensus [12, 3, 7]. In countries that are believed to have collectivist and more community-oriented cultures, such as China or Japan, people see themselves as part of a group, and prefer collective decision-making with distributed responsibilities [31]. In

Citing & Referencing

Avoiding Plagiarism

Fig. 1. On the shoulder of a giant**.** Image source: South Germany, about 1410. File: Library of Congress, Rosenwald 4, Bl. 5r.jpg. (2015, September 16). *Wikimedia Commons, the free media repository*. Retrieved: 13 Mai 2017. URL: https://commons.wikimedia.org/w/index.php?title=File:Library_of_Congress,_Rosenwald_4,_Bl._5r.jpg&oldid=172142764.

Fig. 2. Homepage of Google Scholar, containing the motto „Stand on the shoulders of giants“. Retrieved: 03 June 2022. URL: https://scholar.google.de/schhp?hl=en&as_sdt=0.

Documenting Sources

Direct Citation

- where you quote a source directly, word for word (=quotation)
- where you reproduce source material without alteration (e.g. diagrams, charts, other audio-visual material)

Indirect Citation

- where you reproduce part or all of someone else's idea in your own words (commonly known as *paraphrasing*)
- where you use or summarize someone else's research
- where you use facts or data that are not common knowledge
- where you reproduce source material in slightly altered form while retaining the main idea or structure

NB: Both direct and indirect citations require proper documentation.
Quotations must be enclosed within quotation marks or set off in a block quote.

α
A

and of correct citing (IEEE style)

Ω
O

Image source: T. McAdoo, *References Versus Citations*. [Blog post]. Retrieved from APA Style Blog (2017) . Available: Wayback Machine, https://web.archive.org/web/20180729174628/https://blog.apastyle.org/apastyle/2017/09/index.html. (Accessed: 05.04.2024). The image is used under fair use for educational purposes.

CITATIONS

Appear in narrative parts of the document and hint at the list of references. This is why they are often called i*n-text citations.*

Purpose:

a) Support statements of the author

b) Document sources of paraphrases and word-by-word quotations.

Citations are mentioned in two different ways:

Narratively (author-oriented citations):
In the last few years, the successful publications of Day & Gastel [1], Truss [2], and Pears & Shields [3] on scientific writing have been updated and issued in a new edition.
or
Parenthetically (content-oriented citations):
In the last few years, several successful publications on scientific writing have been updated and issued in a new edition [1], [2], [3].

(LIST OF) REFERENCES

Placed at the end of a document, the list is a comprehensive set of the full bibliographical references of all documents mentioned in the narrative. Individual entries are sequenced in the order of appearance in the text according to the *´who–what–where–when´* principle.

Purpose:

a) Acknowledge ideas borrowed from other sources.

b) Help the reader find these sources, thus enabling them to read the original.

[1] R. A. Day and B. Gastel, *How to Write and Publish a Scientific Paper*, 9th ed. Cambridge, UK: Cambridge University Press, 2024. (First issued in 1979)
[2] L. Truss, *Eats, Shoots and Leaves: The Zero Tolerance Approach to Punctuation*, 4th ed. London, UK: HarperCollins, 2009. (First issued in 2003)
[3] R. Pears and G. Shields, *Cite Them Right: The Essential Referencing Guide*, 12th ed. London, UK: Bloomsbury Publishing, 2022. (First issued in 2006)

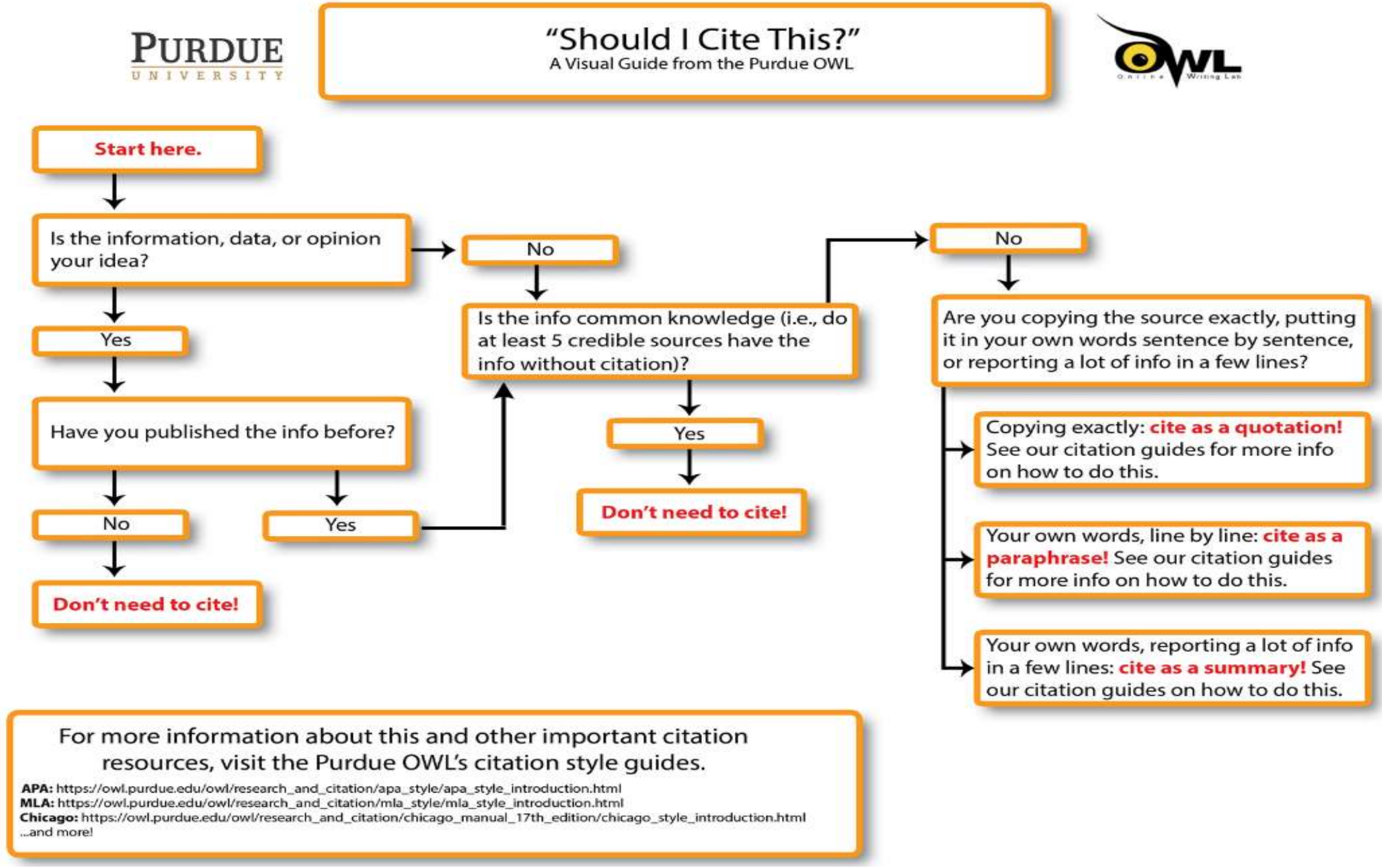
IEEE ON PLAGIARISM

"… plagiarism [is] the reuse of someone else's prior processes, results, or words without explicitly acknowledging the original author and source."

Levels of misconduct:

- **Level 1** = uncredited verbatim copying of a full paper, or the verbatim copying of a major portion (> 50%), or verbatim copying within more than one paper by the same author(s).
- **Level 2** = uncredited verbatim copying of large portion (between 20-50%) or verbatim copying within more than one paper by the same author(s).
- **Level 3** = uncredited verbatim copying of individual elements (paragraph(s), sentence(s), illustration(s), etc.) resulting in a significant portion (up to 20%) within a paper
- **Level 4** = uncredited improper paraphrasing of pages or paragraphs
- **Level 5** = credited verbatim copying of a major portion of a paper without clear delineation (e.g., quotes or indents)

https://owl.purdue.edu/owl/research_and_citation/using_research/documents/20200617ShouldICiteChart.png



https://owl.purdue.edu/owl/research_and_citation/using_research/documents/20200617ShouldICiteChart.png

May I cite this work? – Yes, if …

… the right to citation can be applied

- Is there a purpose of citation? Is there a connection between the citation and your own work?
- Did you explain the connection between both works?
- Is the length of the citations appropriate? Did you cite only as much as necessary?
- Did you mark and reference the citation clearly?

… the work is in the public domain

- Is it a work that doesn't meet the threshold of originality?

oder

- Has the copyright protection already expired?

oder

- Is the work marked as in the public domain?

… you have a permission from the copyright holder

- Is a corresponding license granted?

oder

- Do you have permission from the copyright holder?

Cite this work and give proper reference!

SCIENTIFIC STORYTELLING

Types of Research Stories

1. **Hypothesis story**
   - Stating hypothesis
   - Testing hypothesis
   - Discussing implications

Speculative
Reconstructed logic not always actual logic of research
Frequent use of passive voice

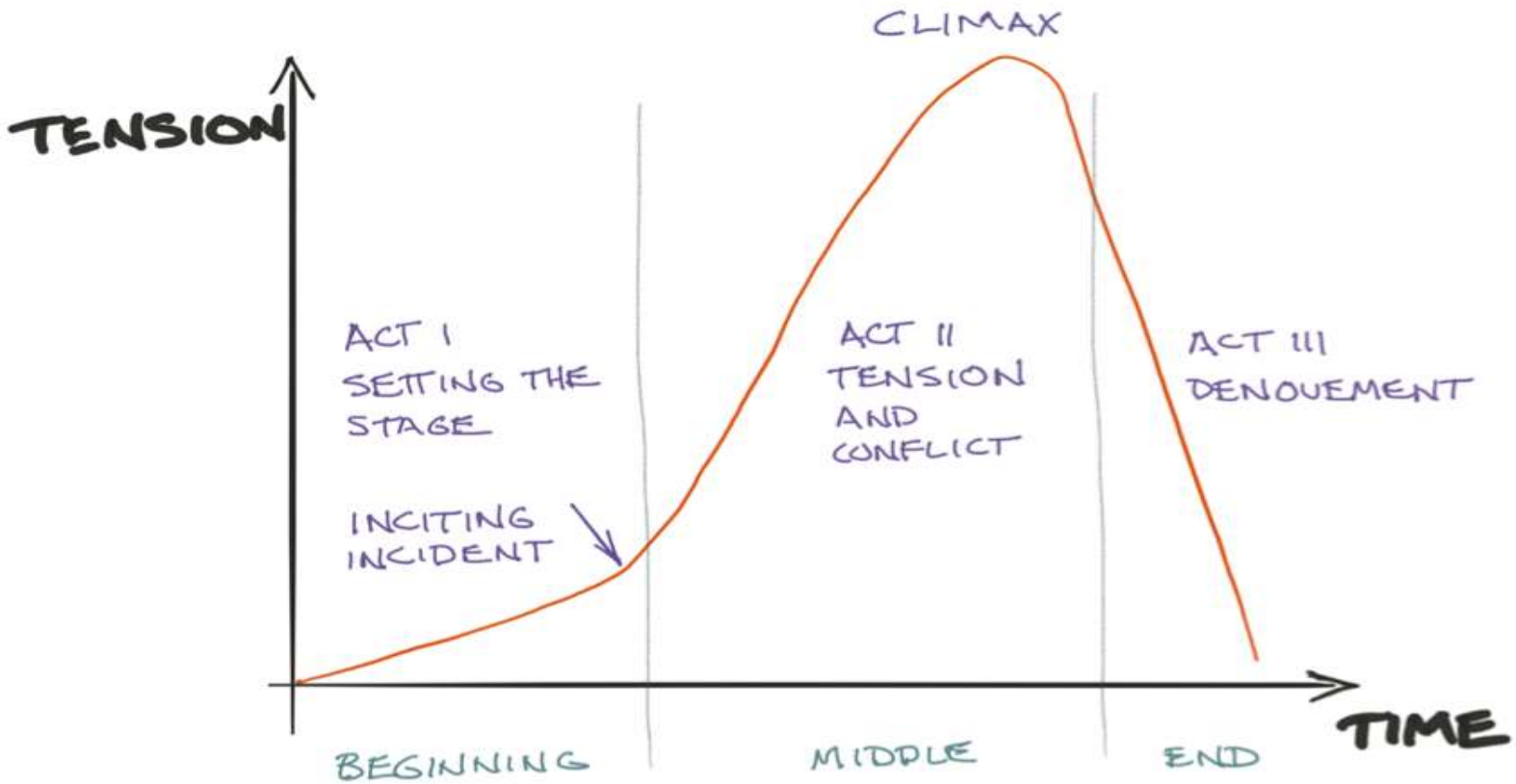
2. **Analytical story**
   - Key concepts
   - How do findings shed light on concepts
   - How do findings relate to research problem & literature

Maximally transparent
More conversational
Immanently embedded in state of the art

3. **Mystery story**
   - Empirical examples
   - Developing research questions
   - Finding connections between questions & data
   - Gradually leading to interpretations of the data
   - Inductively finding the implications of the interpretations

Engaging readers´ interest and attention
Tension-suspense-climax-catharsis line
Reflects inductive form of research

Science Needs Story



Act 1: And…
Act 2: But…
Act 3: Therefore.

Olson, R. *Houston, We Have a Narrative: Why Science Needs Story.* 2015, University of Chicago Press, Chicago.

SCIENTIFIC STORYTELLING: ABT-EXAMPLES

And-But-Therefore for a service organization.

Many patients are suffering AND
You've developed a promising new molecule AND
You want to get your drug to market
But clinical trials are complicated AND
FDA regulations are complex AND
Recruiting the right kinds of patients is really difficult AND
Without these patients, your trial will fail
Therefore, work with the team that has unparalleled patient recruitment experience AND
Is therapeutically specialized AND
Can help you through the regulatory challenges you face.

And-But-Therefore for a laboratory product.

You need accurate scientific results from your laboratory equipment **AND**
Your team is depending upon you to deliver these results quickly **AND**
You need the highest resolution possible
But processing high resolution results takes a long, long time using current technology **AND**
High-resolution equipment is typically very expensive
Therefore, select the XYZ-1000, the innovative new equipment that costs no more than other equipment **AND**
Has the best resolution available anywhere **AND**
Delivers results in half the time that other equipment does.

How would you tell the ABT story for your CS research project?

THE DETAILED ABT

[State of the art],

AND [What's at stake, maybe even using the IF/THEN structure],

BUT [WHAT], [WHY],

THEREFORE [WHAT], [HOW].

Style

PUNCTUATION MATTERS

Where to Use the Comma

- Introductory/transitional (1)
  - words *Therefore,... Firstly, ... However, ...*
  - phrases *On the one hand, ... In consequence, ...*
  - clauses *If this works, ... Whatever they say, ...*

  + also sentence-constituting adverbials advanced to initial position!
    Optional: up to five words
    Recommended: five or more words
  - words *Quickly(,) ... Above (,) ... Yesterday (,) ...*
  - phrases *Very deeply(,) ... At home(,) ... In the next few months of the year, ...*
  - clauses *Because they realized possible difficulties, they ...*
    Wherever you see an introductory phrase, you ...
    While you are writing your answers, I am going to ...
- Horizontal lists *a, b (,) and c* (serial or Oxford comma; AmE: mandatory, BrE: optional)
- Insertions
  - transitions *..., accordingly, ...*
  - relativization *..., in my opinion, ...*
- Quotation marks *"Pretty good," she said.*
- Dates *25, June, 2020* (*BUT: 25th June, 2020 OR: 25 June 2020*) *on June 25, 2020 ...*

Image Source: Free Cliparts
https://www.netclipart.com/isee/TxhTwT_comma-png-file-red-comma-png/

USE COMMA WITH THE **FANBOYS***

*You have written a good definition, **but** you haven´t corrected your typos.*

*My students want to learn punctuation, **so** I try to visualize the rules.*

*You have written a good definition **but** haven´t corrected your typos.*

*My students want to learn punctuation **and** try to visualize the rules.*

* FANBOYS = the conjunctions for, and, nor, but, or, yet, so

USE SEMICOLON + COMMA WITH LONGER CONJUNCTIVE ADVERBS*

(2)

*You have written a good definition**; however,** you haven´t corrected your typos.*

*My students want to learn punctuation**; therefore,** I try to visualize the rules.*

*We cannot learn all rules of English punctuation; **nevertheless**, we should concentrate on the most frequently used constructions.*

* however, therefore, further, moreover, furthermore, on the other hand, consequently, in contrast, etc.

THE BIG HOWEVER

NOTA BENE:

Besides being a conjunctive adverb linking two sentences, "***however***" can also be used as a parenthetical adverb **inside** a sentence. (3)

*When it is used as a parenthetical adverb, "**however**" is inserted after the subject. Then , **however** , it is punctuated with a comma before and after the word.*

"***However***" as a conjunction or adverb with the meaning "*in whatever manner*" or "*no matter how*" *does not take any punctuation .* (4)

*Punctuation rules are complex **however** you look at them.*

However,(1) punctuating "however" is not an issue that cannot be learnt;(2) in contrast to the FANBOYS rule, however,(3) you have to concentrate on it however(4) you can.

Special Characters / Subset General Punctuation (Examples)

-	Hyphen	user-friendly software, solution-oriented research
–	Figure dash	10 – 15 participants 10¶–¶15 participants (*with numbers in text)*
–	En dash	win–win situation, cost–benefit analysis,
N		parent–child directory, doctor–patient relation
—	Em dash	Use em dashes—like here—for inserted phrases.
M		Use em dashes for additional remarks—like this.
−	Minus sign	35 − 15 = 20 35¶–¶15 = 20 (*in mathematical expressions*)

SPECIAL CHARACTERS / SUBSET GENERAL PUNCTUATION

- Hyphen Unicode (hex): 2010
– Figure dash Unicode (hex): 2012
– N-dash Unicode (hex): 2013
— M-dash Unicode (hex): 2014
− Minus sign Unicode (hex): 2212

Preferred order of punctuation choice for inserted content:

1. M-dashes
2. Commas
3. Parentheses

"I have spent most of the day putting in a comma and the rest of the day taking it out."

Oscar Wilde

Source: Flyer, Centenary exhibition, London, 2000

Thesis Defense Session

- Weeks after thesis submission (4 weeks+)
  - Agree date with your supervisor/advisors
- Presentation: 20-25 min; Q&A: 10-15 min
  - Guideline: 1 min per slide
- A panel of professors & researchers (ca.15 people)
  - But: You are the most knowledgeable person on this topic
  - Goal: Convince the panel that

"I did a great job and I know it inside out"

Some Advice for Your Thesis Defense

- Focus on “things you have done”
  Back with numbers, graphs and tables, drawings, photos
- Time is short
  - 5-min Intro + Setup + Rest: Results (skip Related Work!)
  - Rehearse alone, then with advisors/friends; ask them to be critical
- Be prepared for questions, especially “nasty” ones
  Keep backup slides!
- When challenged, try not to be defensive

  (even if it is called a “defence” ☺)

  “This is a very good question.” → *To buy time*

  “You have raised a good point. I have considered this too. However, due to *<this>* and *<that>,* it was not possible.”

Slides

- Overall
  - Be readable and professional.
    - Proof-read for grammatical/spelling mistakes
  - Many numbers & graphs, but don't overload the audience.
- Text
  - Use colours sparingly; Be consistent
  - Use a good screen font; Avoid text <18pt (This line: 24pt)
    - This is a 16pt boring example of a super long sentence that nobody bothers to read
    - Liberal font use hurts audience's eyes and ruins your professionalism for sure
- Animation
  - To aid your audience, not to show-off your PowerPoint skills.
  - Many people prefer subtle and fast animations. Many do not.

1. Upload your presentation

to Moodle by at latest on Tuesday, June 25h, 2024.

Use .ppt, .pptx, or .ppsx with or without soundtrack, or just a .pdf.

2. Present Your Pre-proposal*

online over Zoom on July 5th, 2024.

Focus on the Introduction section of your thesis proposal.

Explain basic concepts to help understand your matter.

Build your argumentation around the answers in your pre-proposal.

Boost your presentation using any tool according to your preference.

Time slot for presentation: ***5 -10 minutes***

Class discussion: another ***3 -5 minutes***

** As a rehearsal of the thesis defense in a small saved group* ☺