# Methods in AI Research 10
# Scientific Writing

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# Examination of this lecture

- *Not* part of exam
- Useful for:
  - Final report of the course
  - Your professional career

# (Scientific) writing

# Why practice writing?

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# “Blind audition”

# “skill”/talent/charm only visible *after* writing

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# Writing: important & skill

- **Important: Needed throughout your life & career**
- **Skill:**
  - **Can be trained**
  - **Continuous improvement**

# Today's topics

- Why write?
- Audience & goal
- Title & abstract
  - Your own abstract

- Some tips

# Who’s your audience / readers?

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- Internship supervisor
- UU examiner
- 2nd examiner
- Colleagues at internship
- Future employer

- Future students of your program
- Readers of blogs
- Journal editors
- Press

# Tailoring to target audience

1. What's their knowledge & background?
2. What are their interests?
3. What are their expecations?

These differ between audiences

# Example audiences

| | |
|---|---|
| Engineer | Designer |
| Medical doctor | Government |
| Psychologist | Journalist |
| Consultancy agency | Data scientist |

Research on intelligent tutoring system used by high school students

1. What's their knowledge & background?
2. What are their interests?
3. What are their expecations?

# How do I find this out?

- What is emphasized by colleagues during presentations?
- What types of questions do supervisors ask me during meetings (general and for thesis/project)?
- Writing:
  - What is written in (technical) (internal) reports?
  - Which journals and conferences do you read and cite?
- “meta-reading”:
  - Which sections are used? How long are they? What are they called?
  - What is the structure of an argument?
  - Many or few citations? What kinds?
  - Long or short explanation for each section? E.g., experiment design

# Choosing a clear goal

# Choosing a clear goal

- Explain
- Convince
- Demonstrate
- Counter
- Refine knowledge or position
- Enthuse

- Finish degree
- Obtain a “pass” / “sufficient”
- Deliver a nice product
- Get a job offer
- ….

# Articulating your goal clearly

- Be explicit in your text
- Emphasize early in your text
  - Title
  - Abstract
  - Introduction
  - Discussion

# Articulating your goal clearly

- **The aim of this internship is to..**
  - **explain: *explain* how a new interface was designed and how this meets the customer's expectations**
  - **Reject: demonstrate why the current theory that women are better at multitasking than men is *incorrect*.**
  - **Enthuse: *demonstrate* what the *added value* of a detailed research effort into multitasking is**

# How many goals?

- Articles typically have 1 or 2 main goals
  - Multiple subgoals

- (Sub-)Goal can change for each section of your report
  - Convince (why your approach is needed)
  - Explain (what the method of your study is)
  - Demonstrate (what results are)
  - Refine literature (in general discussion)

# Clear goal: Checklist

- **After writing:**
  - **Did I write down my goal explicitly in the text?**
  - **Did I meet my goal?**

- **If you don’t know if you achieved this..**
  - **Probably you weren’t explicit enough…**
  - **Ask a team mate / colleague / supervisor / friend**


- AI is broad, interdisciplinary field
- Expectations differ between sub-domains and -communities
- Check expectations for different assignments / domains / areas / jobs / persons

# Today's topics

- **Why write?**
- **Audience & goal**
- **Title & abstract**
  - **Your own abstract**

- **Some tips**

# Reflection on own writing

- **Title & Abstract**

# Title: Goal

- What's the goal according to you?

- Gain readers' interest in your article
- Communicate rough topic of your article
- Make it possible for (search engines) to find the article
- ..

# Title: Heuristics

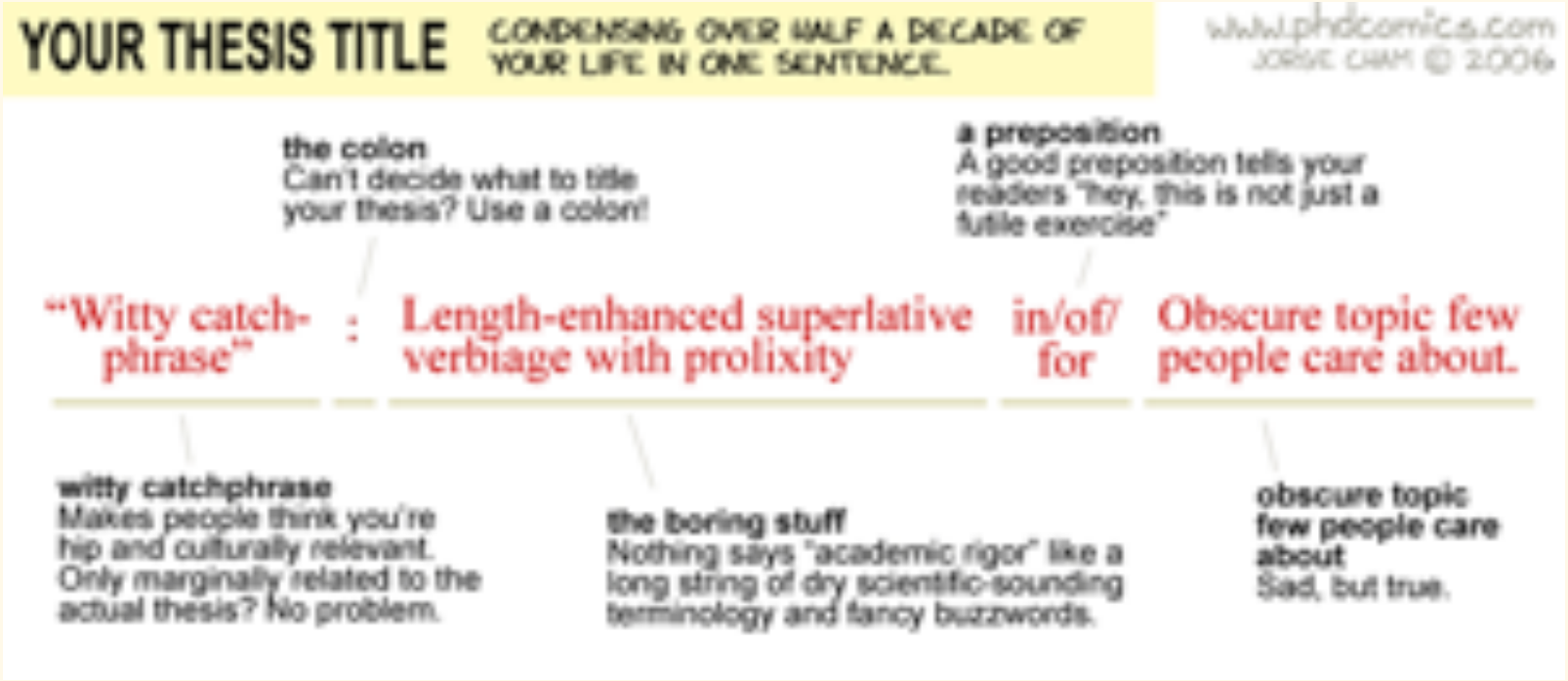
- (Idealy) At most 1 line
- Is about the *content*
- Incorporates most important “keywords”
- Can be “catchy”
  (depending on venue)

- Not: “Final report” “Thesis on …”

# Some good titles

- **Write now!**
- **"A Pace Not Dictated by Electrons": An Empirical Study of Work Without Email**
- **Cars, Calls, and Cognition: Investigating Driving and Divided Attention**
- **What happens when we switch tasks: Pupil dilation in multitasking.**
- **Can Computational Goals Inform Theories of Vision?**
- **The Adaptation of Visual Search to Utility, Ecology and Design**
- **Wie slim is, stapt in de kunstmatige intelligentie**
- **Media: Tijd in beeld.  Dagelijkse tijdsbesteding aan media en communicatie**

# Title


YOUR THESIS TITLE
CONDENSING OVER HALF A DECADE OF YOUR LIFE IN ONE SENTENCE.
www.phdcomics.com
JORGE CHAM © 2006
the colon
Can't decide what to title your thesis? Use a colon!
a preposition
A good preposition tells your readers "hey, this is not just a futile exercise"
"Witty catch-phrase"
:
Length-enhanced superlative verbiage with prolixity
in/of/for
Obscure topic few people care about.
witty catchphrase
Makes people think you're hip and culturally relevant. Only marginally related to the actual thesis? No problem.
the boring stuff
Nothing says "academic rigor" like a long string of dry scientific-sounding terminology and fancy buzzwords.
obscure topic few people care about
Sad, but true.

# Abstract

- **What is the goal according to you?**

# Abstract: goal

- **Goal:**
  - **Give the reader a complete, succint overview of what you did and why you did it.**
  - **Help the reader decide “should I continue to read”**
- **(most often, not always) Goal is not:**
  - **To write an extensive introduction**

# Abstract: heuristics

- Often: Max 150-200 words
- (APA) First sentence describes core of article
- Each section of your report is covered briefly (sometimes implicitly)
- No irrelevant (or too detailed) issues are discussed
- Raise reader's curiosity: show why what you did is ”important” or ”relevant”
- Help a reader decide whether to continue

- (most often, not always) not an introduction

# Abstract: typical sections

- Introduction/ context / motivation
- Hypothesis / Research questions
- Method
- Result
- Conclusion, discussion/interpretation of results
- Implication(s) and/or application opportunities

# Abstract MadLibs!!

This paper presents a _____ method for _____
(synonym for *new*) (sciencey verb)
the _____. Using _____, the
(noun few people have heard of) (something you didn't invent)
_____ was measured to be _____ +/- _____
(property) (number) (number)
_____. Results show _____ agreement with
(units) (sexy adjective)
theoretical predictions and significant improvement over
previous efforts by _____, et al. The work presented
(Loser)
here has profound implications for future studies of
_____ and may one day help solve the problem of
(buzzword)
_____.
(supreme sociological concern)

**Keywords:** _____, _____, _____
(buzzword) (buzzword) (buzzword)

# Example

**Effects of memory rehearsal on driver performance: experiment and theoretical account**

**Salvucci & Beltowska (2008)**

**Objective**: We report an experiment and a theoretical analysis concerning the effects of an exclusively cognitive task, specifically a memory rehearsal task, on driver performance. **Background**: Although recent work on driver distraction has elucidated the sometimes significant effects of cognitive processing on driver performance, these studies have typically mixed cognitive with perceptual and motor processing, making it difficult to isolate the effects of cognitive processing alone. **Method**: We asked participants to drive in a driving simulator during only the rehearsal stage of a serial-recall memory task while we measured their ability to maintain a central lane position and respond to the illumination of a lead vehicle's brake lights. **Results**: Memory rehearsal significantly affected drivers' steering performance as measured by lateral deviation from lane center, and it also significantly affected drivers' response time to the braking stimulus for the higher load memory task. **Conclusion**: These results lend support to a theoretical account of cognitive distraction provided by threaded cognition theory in terms of a cognitive bottleneck in procedural processing, and they also suggest that consideration of task urgency may be important in accounting for performance trade-offs among concurrent tasks. **Application**: The experiment augments the current understanding of cognitive driver distraction and suggests that even exclusively cognitive secondary tasks may sometimes affect driver performance.

# Example

**The Soft Constraints Hypothesis: A Rational Analysis Approach to Resource Allocation for Interactive Behavior**

**Gray et al. (2006)**

# (Gray et al 2006)

Soft constraints hypothesis (SCH) is a rational analysis approach that holds that the mixture of perceptual-motor and cognitive resources allocated for interactive behavior is adjusted based on temporal cost-benefit tradeoffs. Alternative approaches maintain that cognitive resources are in some sense protected or conserved in that greater amounts of perceptual-motor effort will be expended to conserve lesser amounts of cognitive effort. One alternative, the minimum memory hypothesis (MMH), holds that people favor strategies that minimize the use of memory. SCH is compared with MMH across 3 experiments and with predictions of an Ideal Performer Model that uses ACT-R's memory system in a reinforcement learning approach that maximizes expected utility by minimizing time. Model and data support the SCH view of resource allocation; at the under 1000-ms level of analysis, mixtures of cognitive and perceptual-motor resources are adjusted based on their cost-benefit tradeoffs for interactive behavior.

# Your abstract and title

# Read your own title and abstract

- Is your goal clear and explicit?
- Is it interesting and relevant for your audience(s)?
- Would you like to read more about it based on the abstract?
- Is it not an introduction?
- Are these aspects covered:
  - Introduction / context
  - Hypothesis / research question
  - Method
  - Results
  - Interpretation of results
  - Implications (theory and/or practice)

# Read each other's title and abstract

- Is your goal clear and explicit?
- Is it interesting and relevant for your audience(s)?
- Would you like to read more about it based on the abstract?
- Is it not an introduction?
- Are these aspects covered:
  - Introduction/context
  - Hypothesis / research question
  - Method
  - Results
  - Interpretation of results
  - Implications (theory and/or practice)

# Examples of abstracts I have read

**(Observations in these abstracts typically occurred also in other abstracts)**

# What if everything goes down hill…

- **Test yourself: how would you write your abstract then?**

# Today's topics

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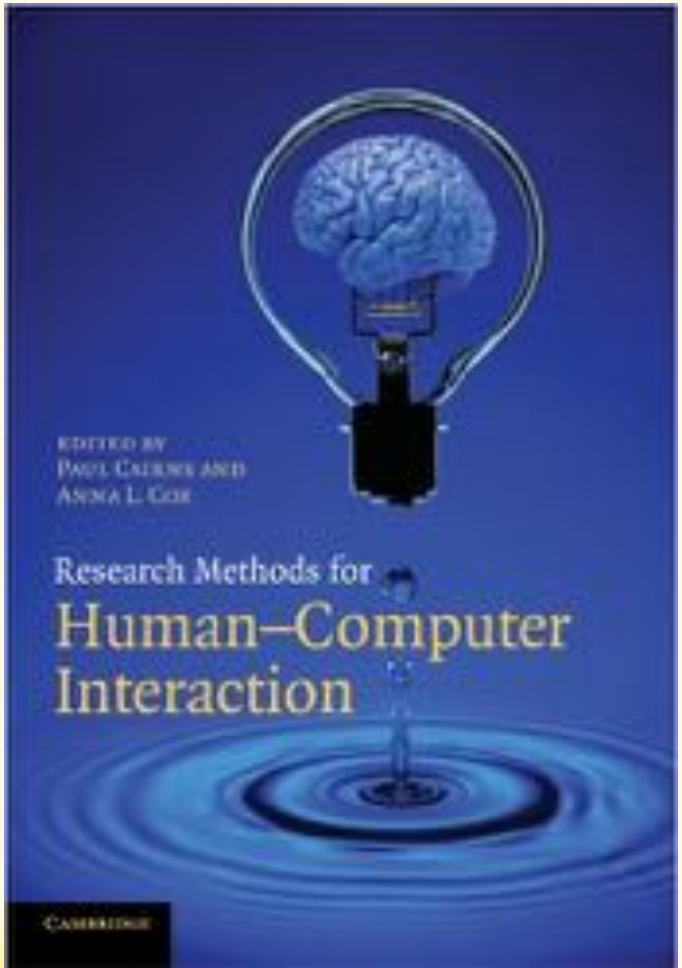
# Tips: reading

- Cairns (2016) on https://www.interaction-design.org/
- Thimbleby write now
- www.grammarly.com
- See also appendix of assignment



# Tips: Professional support

- **Educational Consultancy & Professional development**
  **https://www.uu.nl/en/education/educational-development-and-training/academic-skills-for-students**

- **(more courses in Dutch…)**
  **https://www.uu.nl/onderwijs/onderwijsadvies-training/scholing/hoger-onderwijs/werken-aan-academische-vaardigheden**

# Tip: learn writing by *reading*

- **Read other articles in “meta-style”:**
  - **Who was the intended audience?**
  - **Is the goal explicit and is the goal met?**
  - **How is argumentation structured?**
  - **What sections and headers are used?**
  - **Is there a strict layout?**

# Tip: Write abstract and title first

- Gives you focus
- You can always rewrite

# Tip: develop a writing plan


**Google “schrijfplan” or “writing plan” for sites with tips**

# Tip: develop a writing plan

- Determine audience
- Determine goal(s)
- Write down:
  - Section headers
  - Main claims / arguments
  - How will you support your claim (Literature? Examples? Data?)
- Why?
  - Identify holes in argumentation
  - Avoids getting stuck on details.
  - Keep bigger picture in sight

# Tip: use topic sentences

# Topic sentences

- **Heuristic:**
  - **Each paragraph has 1 core message / topic**
  - **This is written explicitly in the first (or last) sentence**
  - **Each paragraph has 1 topic sentence**

# Topic sentences

- **Sometimes very explicit :**
  - **“The contribution of this research is…”**
  - **“Previous work has shown mixed results in this area…”**
  - **“The goal of the model is to…”**
  - **“The aim of this experiment is to…”**
  - **“Our hypothesis is…”**
  - **“Multitasking is a persistant practice”**

# Use hourglass structure

**Introduction**

**Middle part**
**(“the meat”, ”the specifics”)**

**General Discussion**

# Tip: how to avoid writer's block

# Tip: How to avoid writer's block

- **Start in time (see Thimbleby; Cairns)**
- **Develop a writing plan**
  - **Discuss with supervisor (for assignment: peers) to identify holes in argumentation and discuss those**
- **When you get stuck:**
  - **Writing is not a linear process. Work on "easy section" first (e.g., method)**
  - **Rewriting is easier than writing: write without focusing on exact phrasing**
- **Help each other:**
  - **Meet for coffee. Briefly chat. Spend the day writing**
  - **Read each other's text**

# Tip: Write now. Write, write, write, write

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# My classes: methods covered

- 1/10: Cognitive modeling
- 3/10 Experimentation
- 8/10 Scientific writing
- **10/10 Designing & Evaluating AI and Automated systems**

# My classes: preparation & deadlines (see blackboard)

- 1/10: Anderson, J. R. (2002). Spanning seven orders of magnitude: a challenge for cognitive modeling. *Cognitive Science*, *26*(1), 85–112.
- 3/10: Cairns, P. (2016) Experimental Methods in Human-Computer Interaction. In Soedergaard, Dam (Eds.) *The encyclopedia of Human-Computer Interaction* (2nd edition). Online available at: https://www.interaction-design.org/literature/
- 8/10:
  - Before 7/10 at noon, hand in "Fantasy abstract" via Blackboard individually
  - Before lab: read lab assignment (of part 2)
- **10/10:**
  - **Extra office hour to ask questions about assignment in building "Langeveld", Heidelberglaan 1, room H0.12 (follow signs to "floor 0", then to "section H")**
- **Week of 12/10: Chris in China (no e-mail)**

# Questions?

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