Proseminar/Seminar

Software Engineering in the Neuroage

SS 2023

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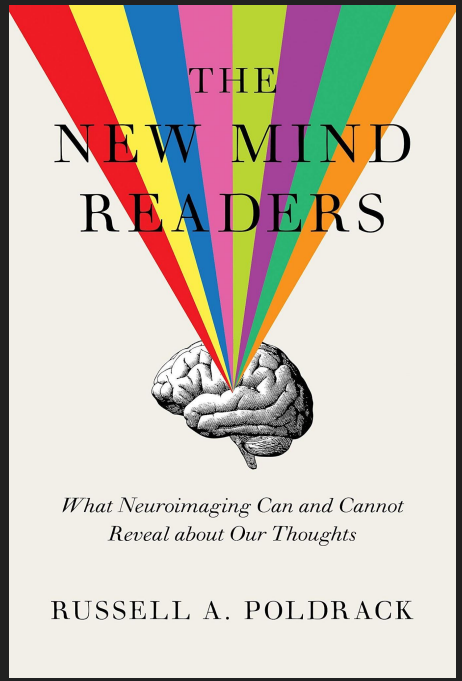
Proseminar/Seminar Specification

Lecturer	Norman Peitek, Annabelle Bergum, Prof. Sven Apel
Assistants	Sebastian Böhm, Christian Hechtl, Christof Tinnes, Kallistos Weis, Marvin Wyrich
Language	English
Task	Summarize your topic, search for related literature, and come up with your own experiment idea related to your topic
Presentation	● 20 minutes presentation + 10 minutes discussion ● Draft of the slides has to be submitted until **15th of June 2023** ● Will be in June/July 2023
Paper	● 15 pages (Seminar), 10 pages (Proseminar) ● LaTeX (LNCS) template is supplied in the CMS ● Plagiarizing and ChatGPT prohibited
Paper Submission	● Topic summary ● Description of related work ● Description of your own experiment idea ● Until **30th of September 2023** (to be uploaded in the CMS)

Basic Literature

Book: R. Poldrack. The New Mind Readers. Princeton University Press, 2018.

- Theoretical foundation
- Availability:
  - Library (computer science)
    - 6 prints
    - 1 constantly available
  - Online (https://www.degruyter.com/document/doi/10.1515/9780691184128/html)



Deliverables

- Summary of the initial literature search and your own experiment idea
  - at least 2 additional papers
  - 1–1.5 pages in sum using the provided LNCS template
  - mandatory to be admitted to the seminar, but not graded yet
- Initial draft of your presentation
  - a complete outline and completely drafted slides
  - mandatory for participating in the seminar, but not graded yet
- Presentation (20 + 10 min)
- Paper (LNCS style) containing topic summary, description of state-of-the-art in science, and your experiment idea
  - 10 pages for the Proseminar
  - 15 pages for the Seminar

Presentation

- Your presentation should cover three topics:
  - A summary of the assigned paper (~40-50% of the presentation time)
  - A very brief summary of found related work (~10% of the presentation time)
    - In particular, why it is relevant and, if applicable, how it motivates your own experiment
  - A high-level overview over your own experiment idea (~40-50% of the presentation time)

- Your own experiment idea should contain…
  - Research questions and their motivation, ideally from the related work
  - Method: How do you plan to collect the data and why is it the right method?

- Note that you can refine your experiment idea after the presentation for your paper
  - Use the feedback and questions!

- The provided times are rough guidelines, deviate if it makes sense in your case
- The final paper should contain similar proportions of 50% summary/related work and 50% own experiment idea

Important Dates

- **Today**: How to perform a literature search?

- **27th of April 2023**:
  - Studies on Program Comprehension by Norman Peitek

- **25th of May 2023:**
  - How to build a presentation?
  - How to design a study?

Attendance mandatory!

Important Dates

- **18th of May 2023**: Submission of the summary of related work & your own experiment idea
- **15th of June 2023**: Initial draft of your presentation
- Your presentations in June/July 2023:
  - Thursdays, 12:15 – 14:00
  - Summarize your topic, show the state-of-the-art in science, and propose your own experiment idea
    - Mandatory attendance for all participants for all presentations
    - Otherwise, you will not pass the seminar (grade 5.0)
    - Recent medical certificate is required if you are not able to participate due to health reasons
  - Detailed schedule will be announced in the CMS
  - Presumably on 22.06.2023, 29.06.2023, 06.07.2023, 13.07.2023, 20.07.2023
  - Planned to be performed in person on-site at the university, attendance in person is mandatory.
- **30th of September 2023**: Final submission
  - Topic summary & presentation of the state-of-the-art & propose own experiment idea

Registration in the LSF/HISPOS System

In order to further participate in this seminar, you need to be registered in the LSF/HISPOS system.

Registration in the LSF/HISPOS system is enabled from 28.04.2023 – 11.05.2023.

This seminar will be graded. The grade is composed of the quality of the presentation and the paper in equal proportions.

Advisor will provide feedback on...

- … the summary of your literature search and your proposed experiment idea
  Mandatory to upload draft of initial literature summary on 18.05.2023!
- … the draft of your presentation slides
  Mandatory to upload draft of your presentation slides on 15.06.2023!
- … early drafts of your seminar paper
  - Feedback on structure of your seminar paper
  - Feedback on literature search & experiment idea
  - Feedback on comprehensibility & writing style

Get in touch with your advisor to get valuable feedback!
Please contact your advisor via e-mail (other communication channels will be ignored).

Topic Matching

	Topic
1.	Seminal fMRI Study on Program Comprehension
2.	Top-Down Comprehension
3.	Code Comprehension & Code Review
4.	Data Structure Manipulation
5.	Bug Detection

Literature

The following book is mandatory to read for this course:

- R. Poldrack. The New Mind Readers: What Neuroimaging Can and Cannot Reveal about our Thoughts. Princeton University Press, 2018.

The following papers and topics are available in this course:

	Topic	Paper
01	Seminal fMRI Study on Program Comprehension	Understanding Understanding Source Code with Functional Magnetic Resonance Imaging
02	Top-Down Comprehension	Measuring Neural Efficiency of Program Comprehension
03	Code Comprehension & Code Review	Decoding the Representation of Code in the Brain: An fMRI Study of Code Review and Expertise
04	Data Structure Manipulation	Distilling Neural Representations of Data Structure Manipulation Using fMRI and fNIRS
05	Bug Detection	The Role of the Insula in Intuitive Expert Bug Detection in Computer Code: An fMRI Study
06	Writing Prose vs. Writing Code	Neurological Divide: An fMRI Study of Prose and Code Writing
07	Expert Programmers	Expert Programmers Have Fine-Tuned Cortical Representations of Source Code
08	Code Review Biases	Biases and Differences in Code Review using Medical Imaging and Eye-Tracking: Genders, Humans, and Machines
09	Complexity Metrics	Program Comprehension and Code Complexity Metrics: An fMRI Study
10	Functional Connectivity	Connecting the Dots: Rethinking the Relationship Between Code and Prose Writing with Functional Connectivity
11	Cognitive Load of Code Comprehension	The Effect of Poor Source Code Lexicon and Readability on Developers' Cognitive Load
12	Cognition & Novices	Relating Reading, Visualization, and Coding for New Programmers: A Neuroimaging Study
13	Replication Study without fMRI	A Replication Study on Code Comprehension and Expertise using Lightweight Biometric Sensors
14	EEG & Programming	Towards an Affordable Brain Computer Interface for the Assessment of Programmers' Mental Workload
15	EEG & Programmer Expertise	Correlates of Programmer Efficacy and their Link to Experience: A Combined EEG and Eye-Tracking Study