Seminars around Brain-Computer Interfaces

For BSc: 4 topics on

Foundations of Brain Signals and Brain-Computer Interfaces

For MSc: 8 topics on

Algorithms for the Real-Time Decoding of Brain Signals

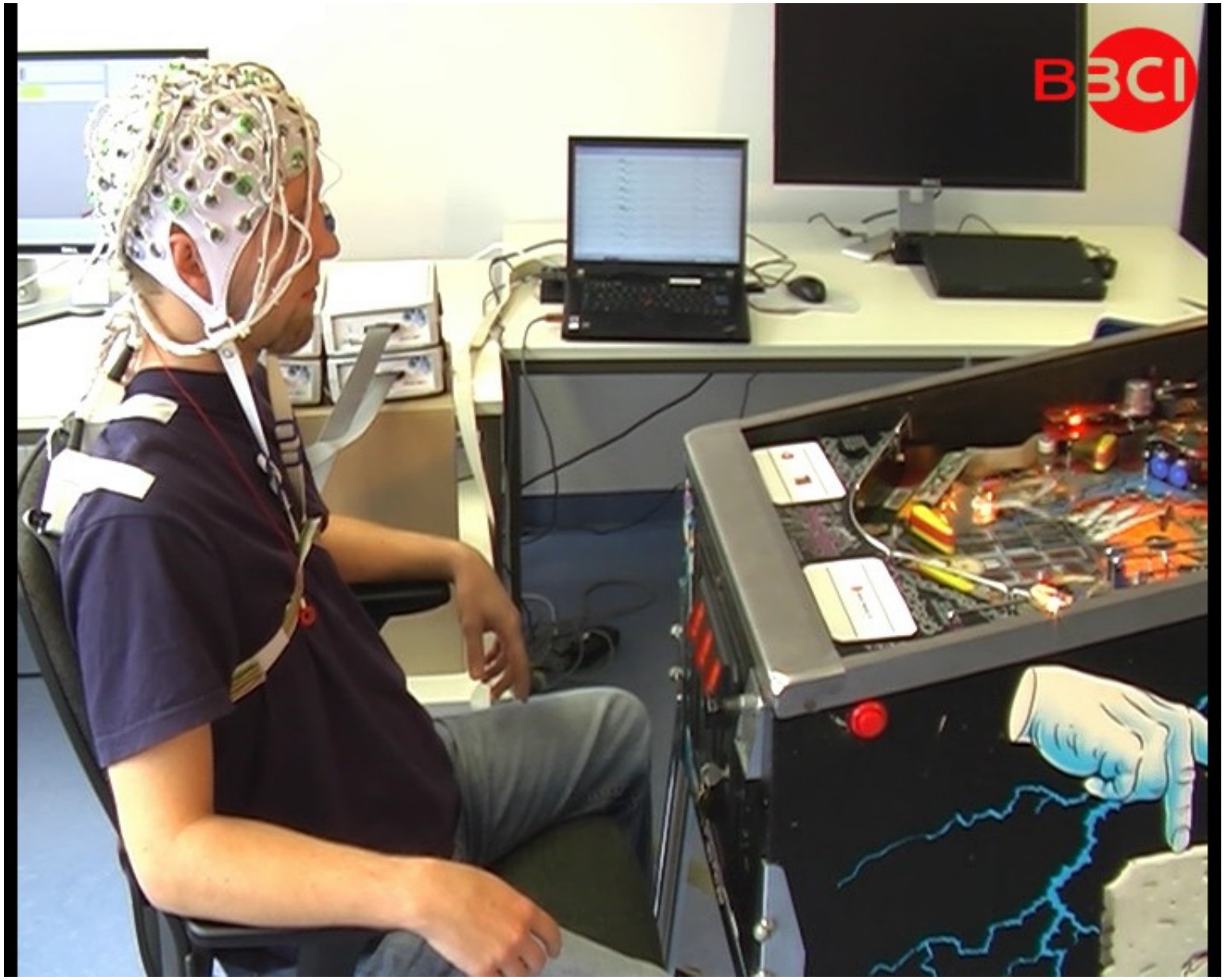
and 5 topics on

Advanced Neurotechnological Applications

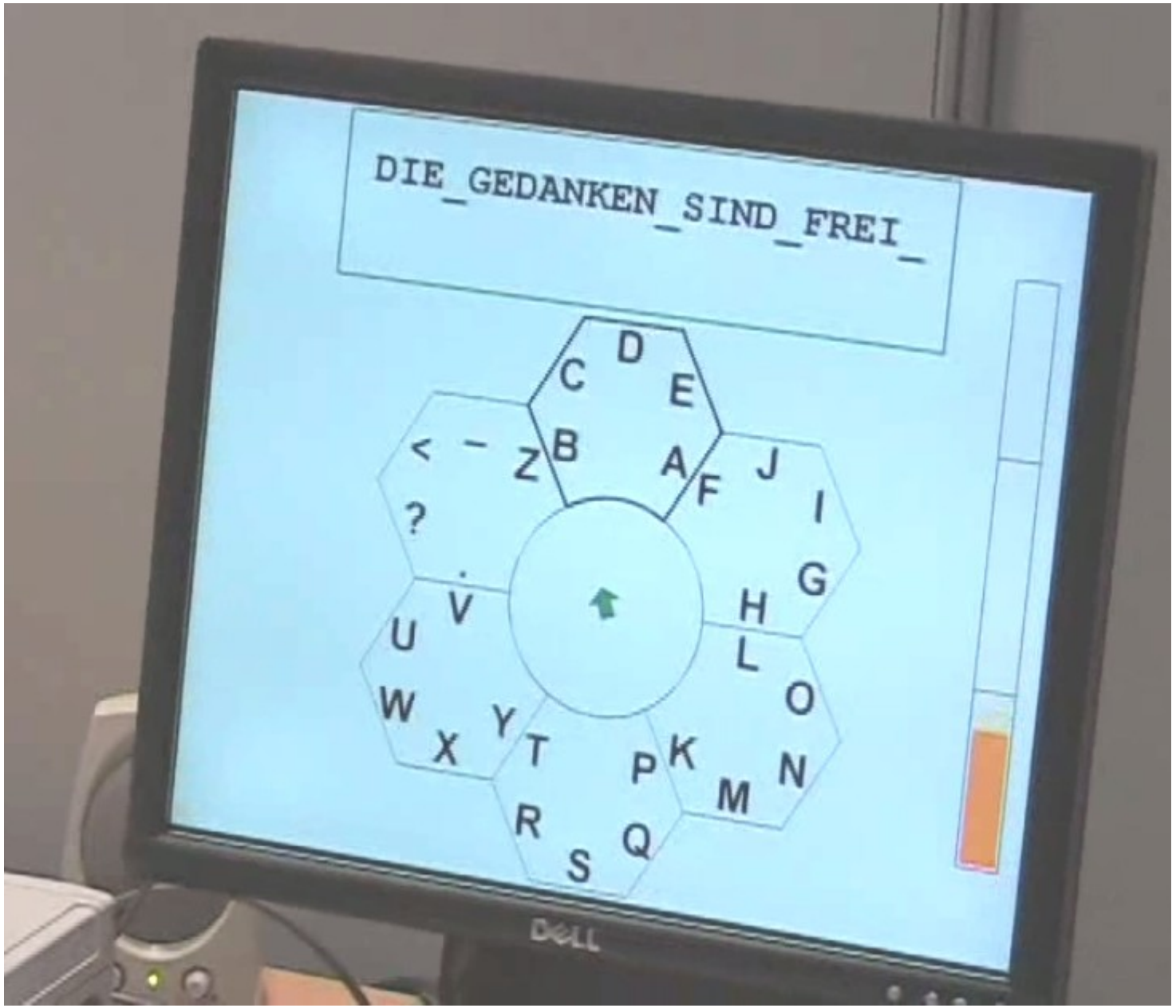
Tonio Ball – tonio.ball@uniklinik-freiburg.de
Wolfram Burgard – burgard@informatik.uni-freiburg.de
Michael Tangermann – michael.tangermann@blbt.uni-freiburg.de

www.bsdlab.uni-freiburg.de/teaching/sose19

Control a physical device via BCI:



Spell text using motor imagery:



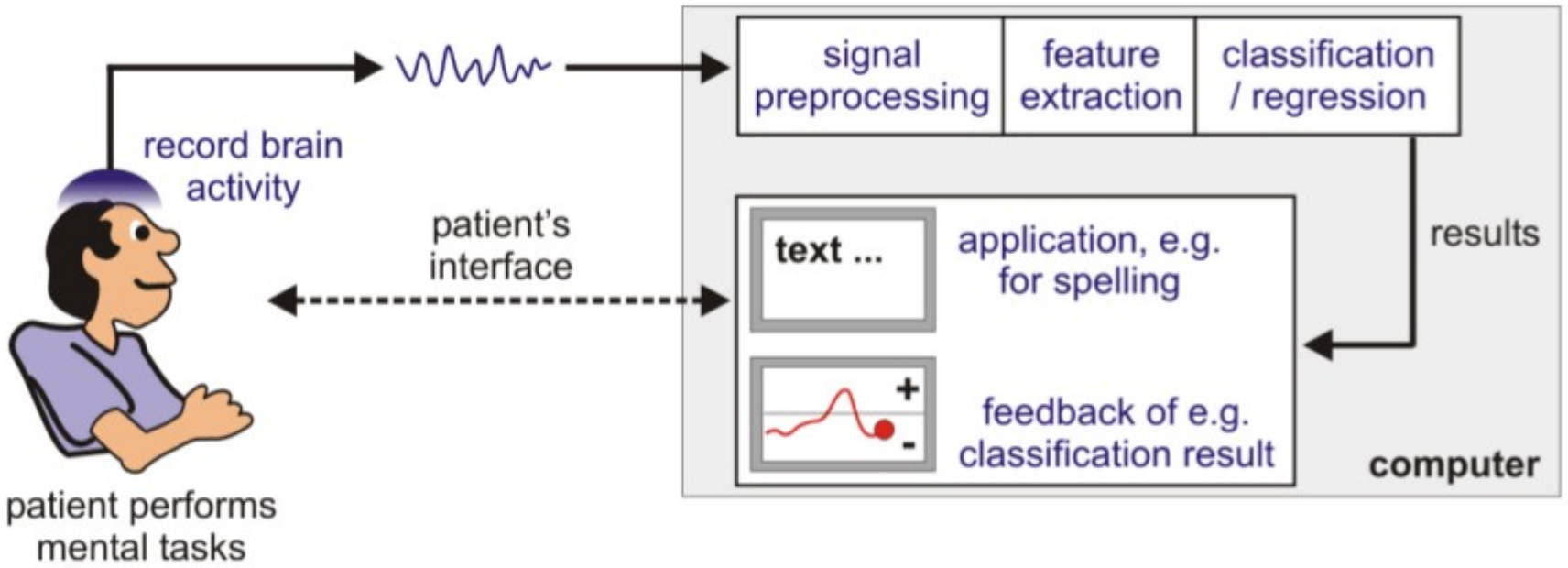
Play a chess game using visual attention:

Monitors mental workload:

Brain-Computer Interface (BCI)

- measures brain activity
- decodes brain activity with machine learning methods
- influences / drives an application using the decoded information
- provide visual / auditory feedback
- (stimulate the brain electrically)

BCI Control Scheme

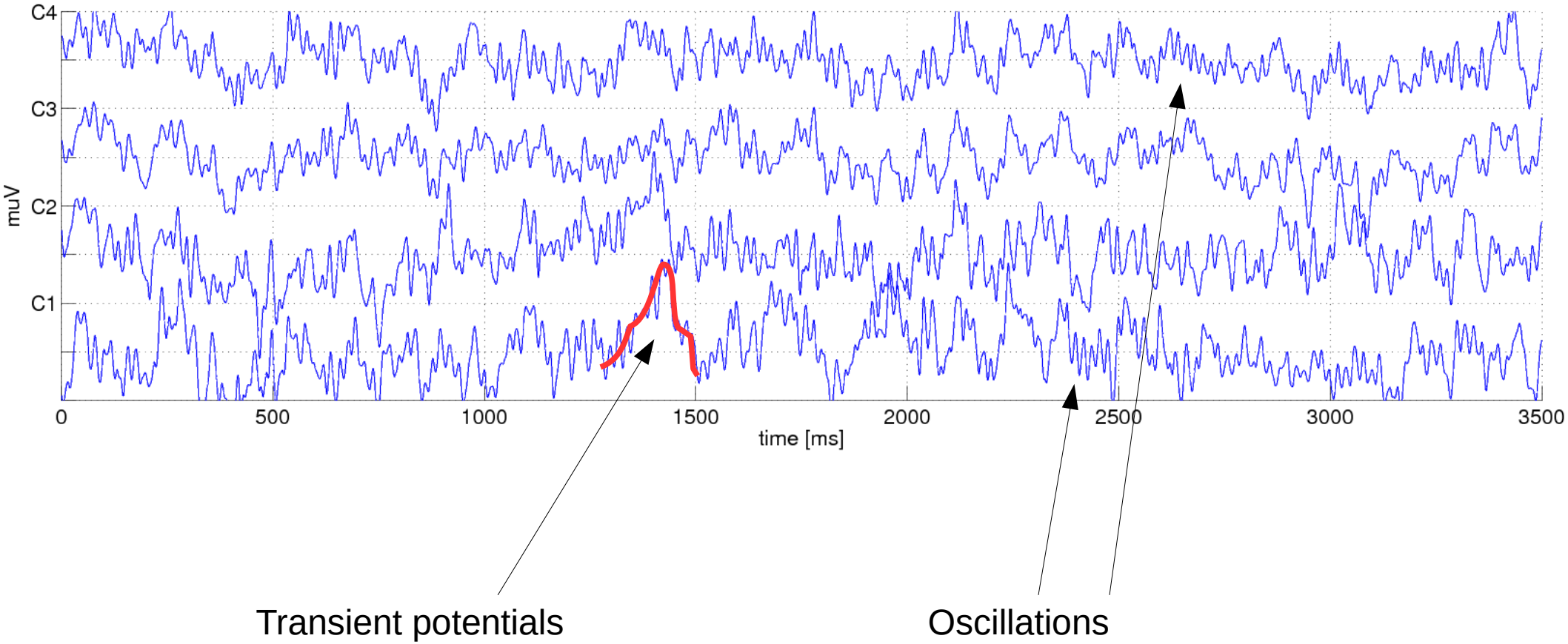


Types of tasks?

1. focus of attention to one of several *external stimuli* (visual, auditory, haptic, ...)
2. *self-initiated* mental imagery tasks (motor imagery, calculation, navigation...)


ANOS

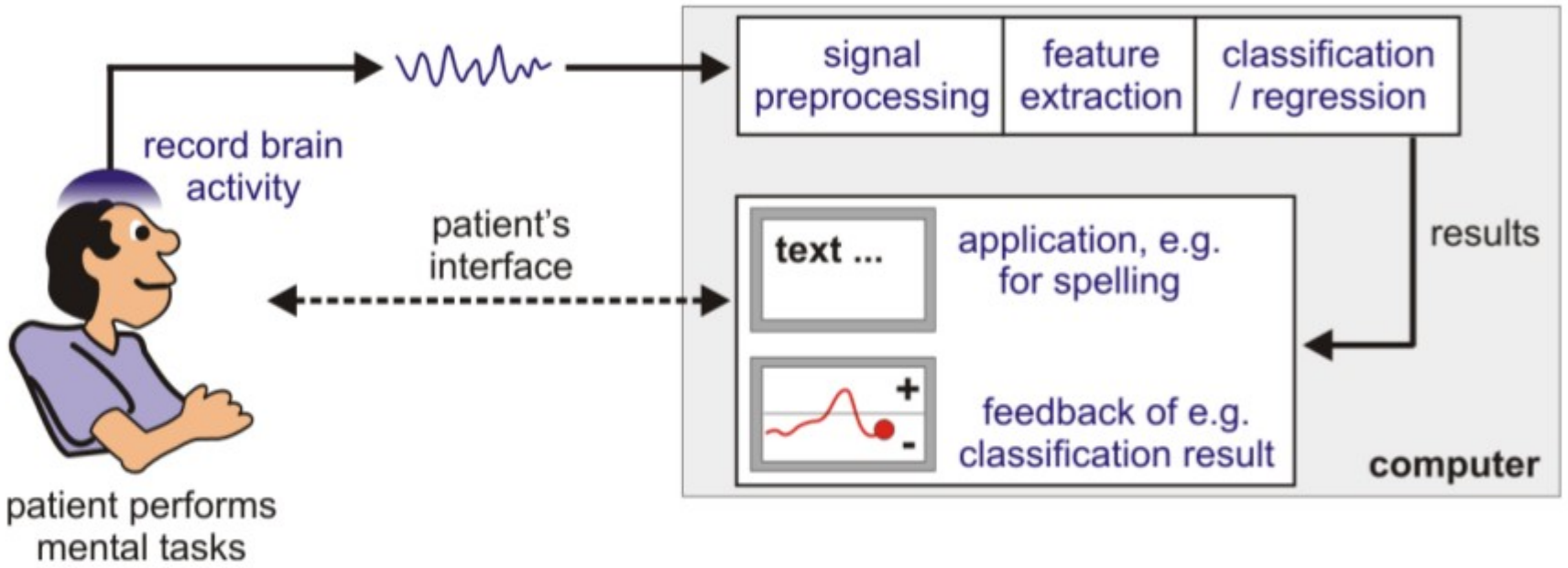
Examples of EEG recordings



Transient potentials

Oscillations

BCI Control Scheme



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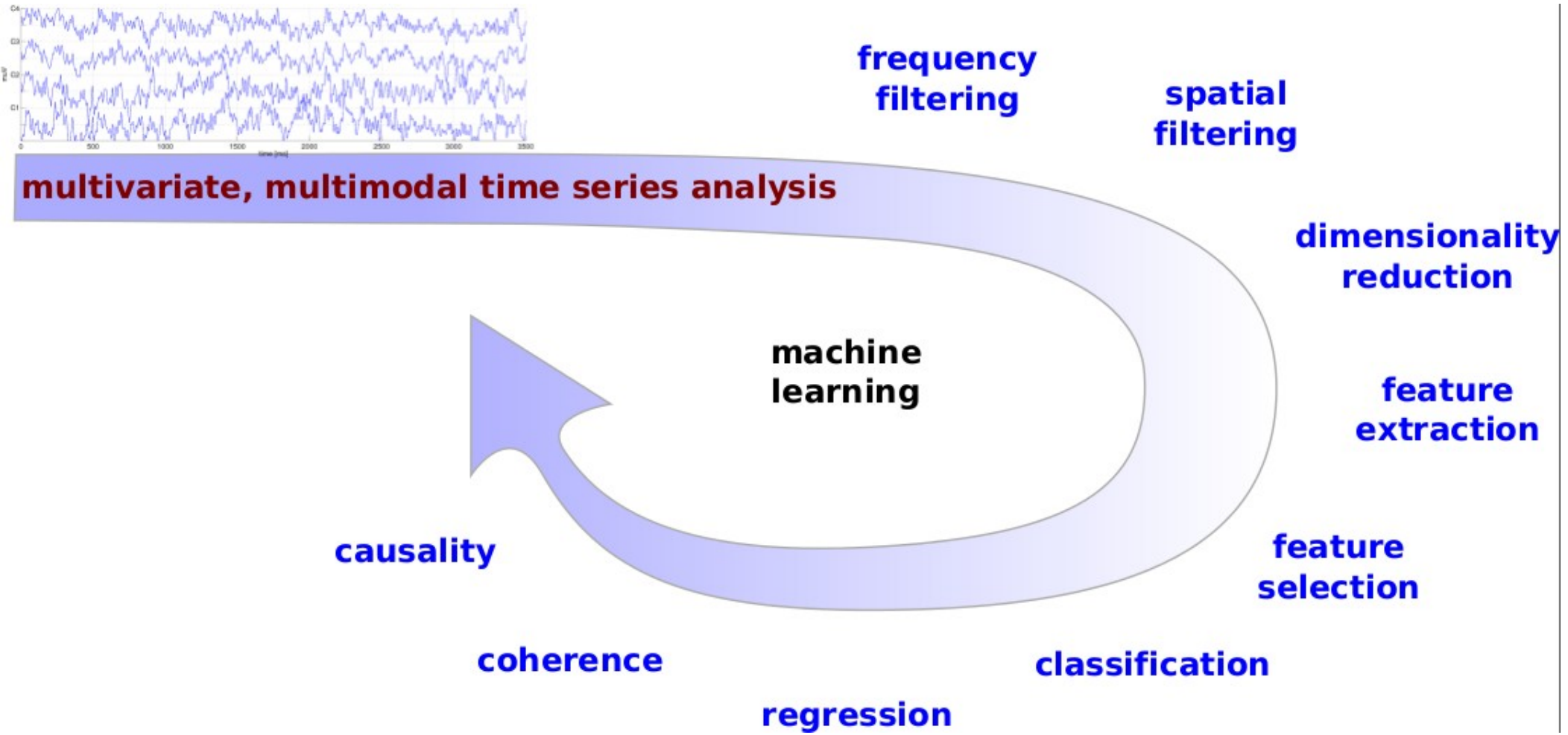
Role of machine learning in BCI?



Schedule / Requirements

- Today: we present topics, you list your TOP3
- Next week (April 29-May 3rd):
  you subscribe via HisInOne,
  we create a matching between participants and topics.
  By the end of the week, the matching is fixed and **you will be enrolled for the Prüfungsleistung (no leaving the course anymore!)**
- Meet your supervisor, pick up initial materials
- Mai 17 (latest):
  Provide your supervisor with a 2-page resumé (commented table of contents) – **course is failed if this deadline is missed.**

Schedule / Requirements

- schedule individual meetings with your supervisor to get your talk into shape
- TBD: Talk on how to give a talk
- July 2nd and July 9:
  one presentation per topic: 40 min (25+10+5)
- Active participation in discussions
- One seminar report per topic: 10 pages

Schedule / Requirements

- We expect every student to attend both sessions
- Your reports are due one week after the last presentation session
  (we expect that you process & include feedback received after your presentation)
- You will receive feedback on your report via your supervisor

Grading

- 60% presentation
- 30% written report
- 10% contribution in discussions
  (Giving and receiving feedback after presentation will be practiced)

Topics

→ Quick glance on topics

→ Enter your preference as a TOP3 ranking (e.g. B4, B1, B2)