Computational Neuroscience: Neural Dynamics

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Language

- slides will be in English
- lectures will be in English
- ask questions in German and ask for clarification of terms

Schedule

- Lecture every Thursday 14:15 to 16:00
- Exercise session from 16:15 to 17:00

Who I am …

- theoretical physicist by training, but working in theoretical neuroscience/ cognitive science and motor control for over 20 years
- second life as a roboticist/computer vision person
- way stations: Saarbrücken, Stuttgart, Boca Raton Florida, Bochum, Marseille, Bochum...

What I am …

- Chair Theory of Cognitive Systems
- Director of the Institut für Neuroinformatik
- joint appointment in the Faculty of Physics and Astronomy and in the Faculty of Electrical Engineering and Information Technology
- teaching faculty Angewandte Informatik
- teaching faculty Cognitive Science

My research

- research in two related areas
  - embodied cognition: motor control, movement planning and representation, decision making, action and spatial memory, scene perception, perceptual representations, motion perception
  - autonomous robotics: vehicles, manipulators, man-machine interface, object recognition, behavioral organization, learning
- based on the theoretical approach of "DST" (dynamical systems theory) and "DFT" (dynamical field theory)

Jean-Stéphane Jokeit

- will run the exercises
- also available for questions etc.
- jean-stephane.jokeit@ini.rub.de
- a senior doctoral student at the INI who works on movement generation in robotics and humans

Would your present yourself, please?

- Name
- which discipline
- which semester
- taking this course
  - as course in Angewandte Informatik Master program
  - as “nicht-X Nebenfach”
  - as “Vertiefungsfach”
  - for fun...

Would you please send an email to jean-stephane.jokeit@ini.rub.de

- with your name
- Matrikelnummer
- Studiengang and -semester, PO
- (use the email address that you are going to use throughout)

Exercises

- hand-outs ... hand-ins!
- will be corrected by a team, led by Jean-Stéphane
- and will discussed by me and Jean-Stéphane and others in exercise session
- there will be readings, to which exercise sheets will be directed
- there will be an essay, a longer exercise sheet requiring writing organized longer text

Exercises: new feature

- We will have “hands-on” sessions “life” in the exercise hour…
- In which we work with
  - code
  - equations
  - drawings
  - etc..
- you work in groups/alone and we interact with you…

Rules for the lecture course "Neural Dynamics"

1. Exercises are the actual platform for learning. All exercise sheets and reading assignments need to be turned in at the agreed time, usually the week after they have been given out. They will be corrected and graded. Handing in the assignments on time is the prerequisite for obtaining Bonus points.

    - Late delivery is accepted only if announced ahead of time with an excuse. Send an email to `jean-stephane.jokeit@ini.rub.de`.

2. The written solutions to exercises and assignments should be written in English or German, using complete sentences. When Matlab code is requested, that code should be sent by email to `jean-stephane.jokeit@ini.rub.de`.

    - Structure your answers intelligently, first explaining assumptions and conventions.
    - Make drawings whenever useful.
    - If you use mathematical formalism, define your variables.

3. There will be one *essay* assignment, in which you will be asked to produce a longer text (e.g., on the order of 10 pages) to discuss an issue based on a scientific article that you will have to read.

4. The exercises handed in are corrected and graded (on a % scale). The grades multiply the Bonus points obtained for each exercise. Bonus points for the essay are multiplied by 3. The maximal total number of bonus points for exercises and essay will provide for up to 1/3 of the grade of the course.

5. There will be a written or oral exam at the end of the lecture course. In the exam, no written material can be used except for a sheet of paper (size A4), on which you have made notes as reminders (you can use both sides, can be hand-written or printed, can include drawings).

6. A prerequisite for a passing grade in the course is that the exam achieves a mark of at least 50%. Below that threshold, the mark will be a "fail".

7. If the threshold is passed in the exam, the final grad for the course is computed from the mark of the exam with a weight of 2/3 and the mark from the bonus points with a weight of 1/3 as long as this grade is better than the mark of the exam. Otherwise, the final grade is the mark obtained in the exam.

Web info

- all slides, exercises, and this rule sheet are available on the web:
  - at www.ini.rub.de
  - navigate to teaching and to “neural dynamics”…

Matlab

- some exercises will make use of Matlab (the “matrix laboratory”), an interpreted language for numerical simulation.
- a free license is available for RUB students… go to
  - http://it-services.ruhr-uni-bochum.de/software/matlab

Tutorials

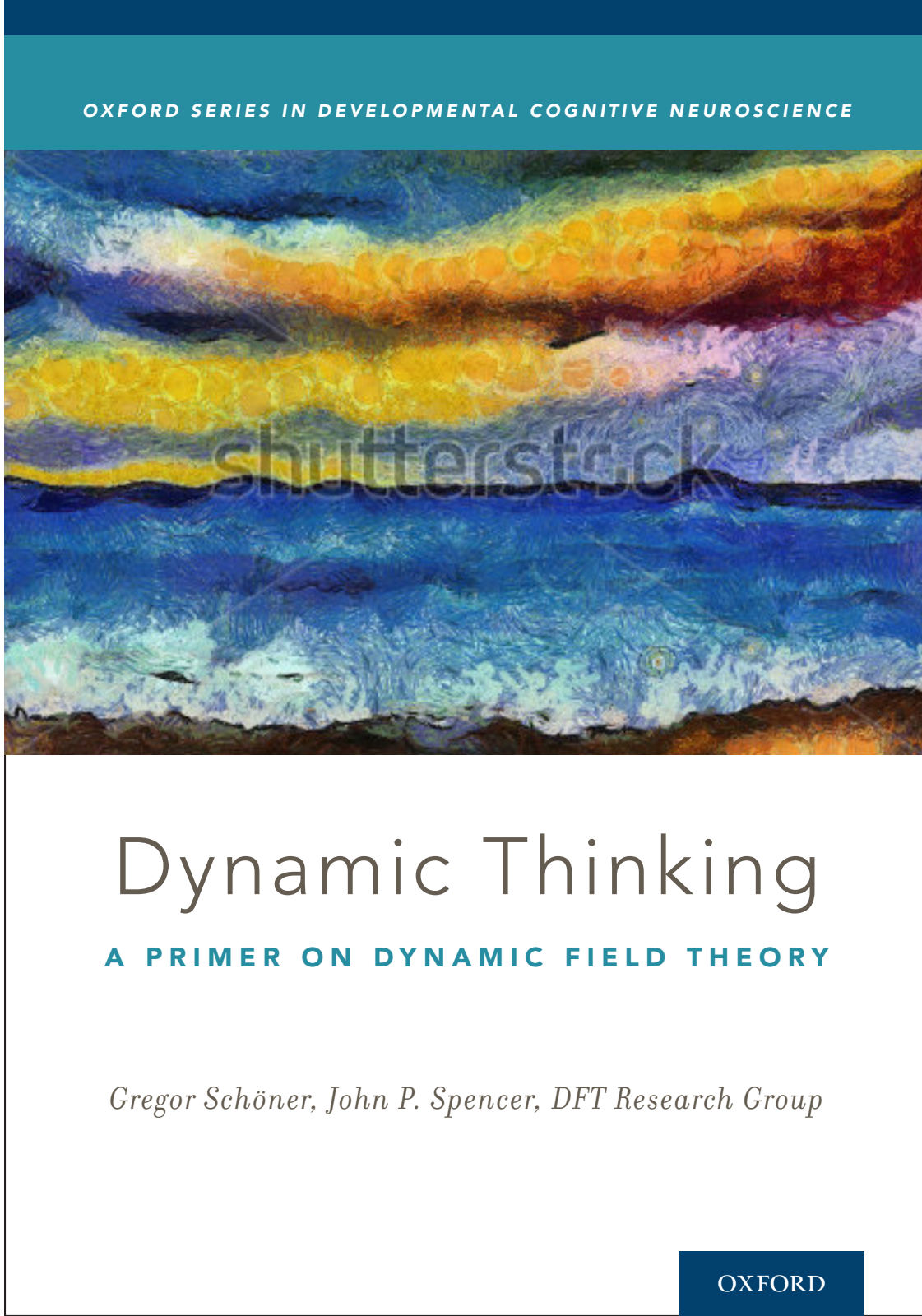
- I'll insert tutorials, special units the give background you might be missing… in response to feedback from you, e.g.
  - mathematical concepts like nonlinear dynamics and instabilities
  - neuroscience background like fundamentals of neurophysics, neuroanatomy, neurophysiology
  - cognitive science background like connectionism vs. information process, symbolic computation etc.

Individual tutoring

- we offer help, e.g. for those students with less of a mathematical back-ground… ask us/me and we arrange a tutorial session
- or also for those you who struggle with other parts, the conceptual language, the neural background..

Script/text book

- We will be following in part a new book



Script/text book

- We will essentially do the first 4 chapters (of 15)
- You will get to read them…