Computational Neuroscience: Neural Dynamics

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Welcome

- This is will be a hybrid inverted classroom course..
- For each lecture, a video will be made available that students should watch BEFORE the lecture hour.
- During the lecture hour, we'll discuss the material presented in the video. So to profit from that, you MUST have seen the video beforehand.
- That discussion takes place in the classroom, but can also be followed in real time through a Zoom channel.
- Both students in the class room and students following online should and can ask questions.

Welcome

- The same format and same Zoom channel will be used for the exercise sessions… In these, the solutions of the corrected exercises will be discussed. The exercise session can also be used to ask general questions.

Online interface

- The course uses e-learning features provided through the INI webpages. Once registered, the e-learning webpages at ini.rub.de will give you access to the video lectures, the zoom room, the lecture slides, readings, exercise sheets, and more. You will upload your exercise solutions and will see the marked corrections to your solutions there. You can also ask questions in the "discussion forum".

When we are in Zoom

- You are welcome to keep video on or off at your choice
- Audio off by default, but use audio to ask questions
- You can also use chat to communicate (I won't see it easily while speaking though)
- The life sessions will not be recorded

Language

- slides and lectures are in English
- but feel free to ask questions in German or also ask for clarification of terms

Schedule

- Live session every Thursday 14:15 to 16:00
- Live exercise session from 16:00 to 17:00

Who am I

- 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, Indiana, Bochum…

What am I?

- Chair Theory of Cognitive Systems
- former director of the Institut für Neuroinformatik INI, which is merging into the new Faculty of Informatik
- joint appointment in the Faculty of Physics and Astronomy and in the Faculty of Electrical Engineering and Information Technology

My research

- research in two related areas
  - embodied cognition: motor control, movement planning and representation, decision making, action and spatial memory, visual working memory, perceptual representations, motion perception, grounding of language
  - autonomous robotics: scene representation, object recognition, behavioral organization, reaching and grasping, timing, learning
- emphasis on integration using dynamical systems ideas, formalized as Dynamic Field Theory (DFT)

Daniel Sabinasz

- will run the exercises
- and will available for questions etc.
- see webpage for email
- doctoral student at the INI who works higher cognition within DFT

Who are you?

- RUB Angewandte Informatik
- RUB Cog Sci
- RUB ETIT
- RUB Physics
- RUB/TUD Medical physics
- RUB Automatisierungstechnik
- TUD Robotics and Automation
- TUD Data science
- RUB Chemistry

Exercises

- are critical to the learning experience!
  - strong correlation between active participation in exercises and success!
- the are somewhat mathematical, but not primarily aimed at math skill
  - more at being precise, understanding precisely, grasping the concepts reading…

Exercises

- readings are parts of many exercises
  - understanding technical texts from diverse fields is part of the learning
  - some readings will be topics of exercises
- writing scientifically is part of the learning
  - making drawings, documenting thought
  - here will be an essay exercise to practice writing and organizing text

Exercises

- hand-outs and hand-ins via the web page
- hand-ins will be corrected by a team, led by Sophie and Mathis and will receive a “grade”
- graded hand-ins will provide bonus point that can improve your final mark by 10% or more

Exercise sessions

- we may ask some of you who provided good solution to present these (not as a “test”)
- difficulties that we found you had will be discussed

Exercise sessions

- we may use some of the exercise sessions for “hands-on” sessions
  - to do simulations, to analyze equations, practice drawings etc.

Exercise sessions

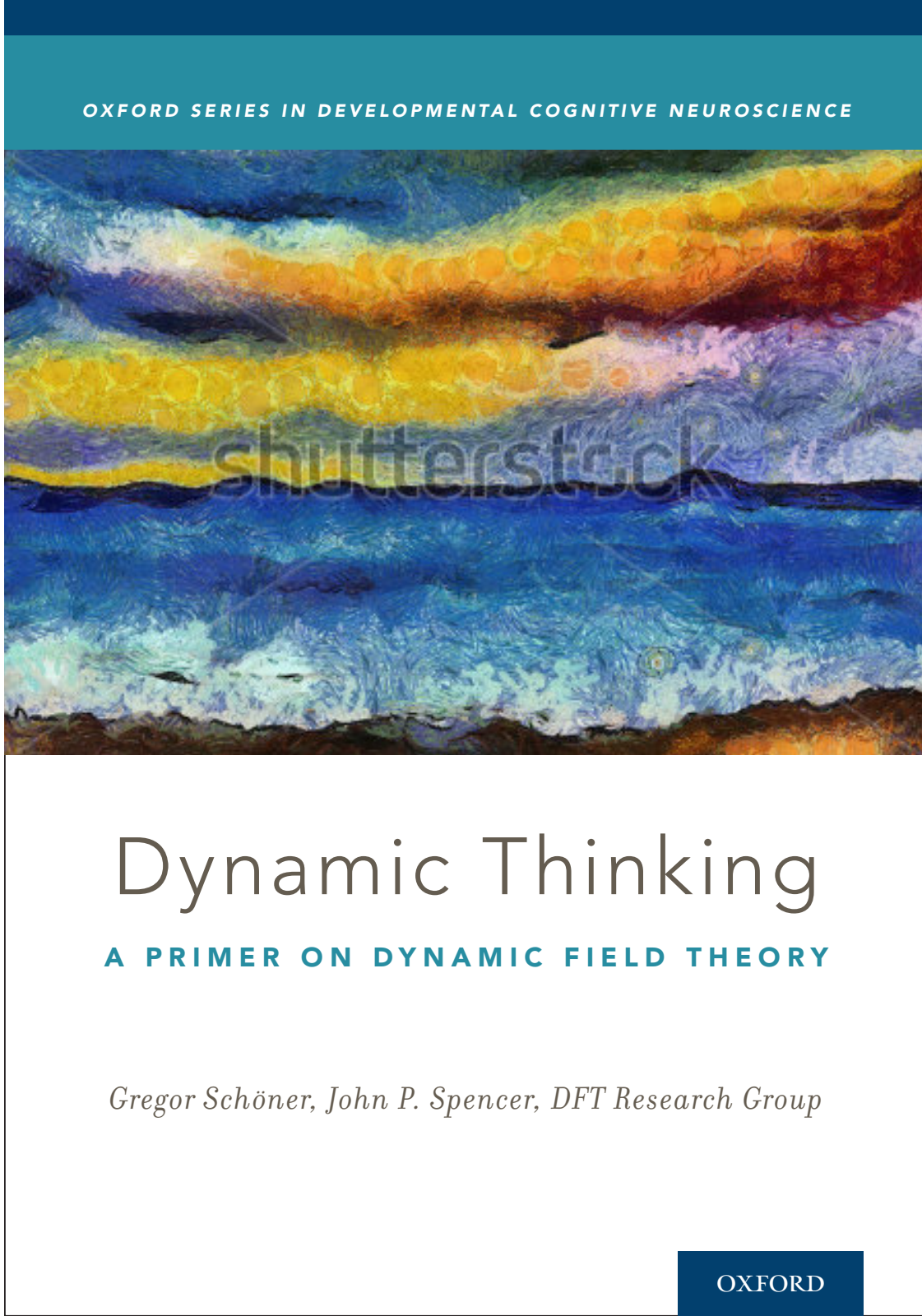
- some sessions will be used for tutorials
  - mathematical concepts like nonlinear dynamics and instabilities
  - neuroscience background like fundamentals of neurophysics, neuroanatomy, neurophysiology
  - cognitive science background like connectionism vs. information process, symbolic computation etc.
- contact me or tutors to suggest tutorials

Rules for credit

- see the online “rules” document…
- exam (may be written or oral): grade of >50% needed for passing
- bonus points from exercises may then lift the grade by 10% points

Script/text book

- We will be following in part a book



Script/text book

- the book webpage provides lot's of material including videos, code, and literature
- dynamicfieldtheory.org