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 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, Bochum...

What am I?

- 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

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
- based on the theoretical approach of “DST” (dynamical systems theory) and “DFT” (dynamical field theory)

Dr. Mathis Richter

- will run the exercises
- also available for questions etc.
- mathis.richter@ini.rub.de
- postdoc at the INI who works on the perceptual grounding of concepts and the generation of conceptual descriptions from perception

Who are you?

Please send this information

- to mathis.richter@ini.rub.de
- Name, First name
- Studienfach
- Fachsemester
- (Prüfungsordnung)
- Matrikelnummer

Web page

- www.ini.rub.de
- then search for course under teaching/ courses…

Exercises

- are critical to the learning experience!
  - reading… understanding technical texts, understanding problem descriptions
  - writing technically, making drawings, documenting thought
- there will be readings, to which exercise sheets will be directed
- there will be an essay exercise to practice writing and organized text

Exercises

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

“Hands-on” sessions

- we will have a few“hands-on” sessions “life” in the exercise hour…
- to do simulations, to analyze equations, practice drawings etc.
- you work in groups/alone and we interact with you…

Matlab

- these “life” 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

Rules for credit

- see the online “rules” document…
- written exam grade of >50% needed for passing
- bonus points from exercises may lift by one grade or more

Tutorials

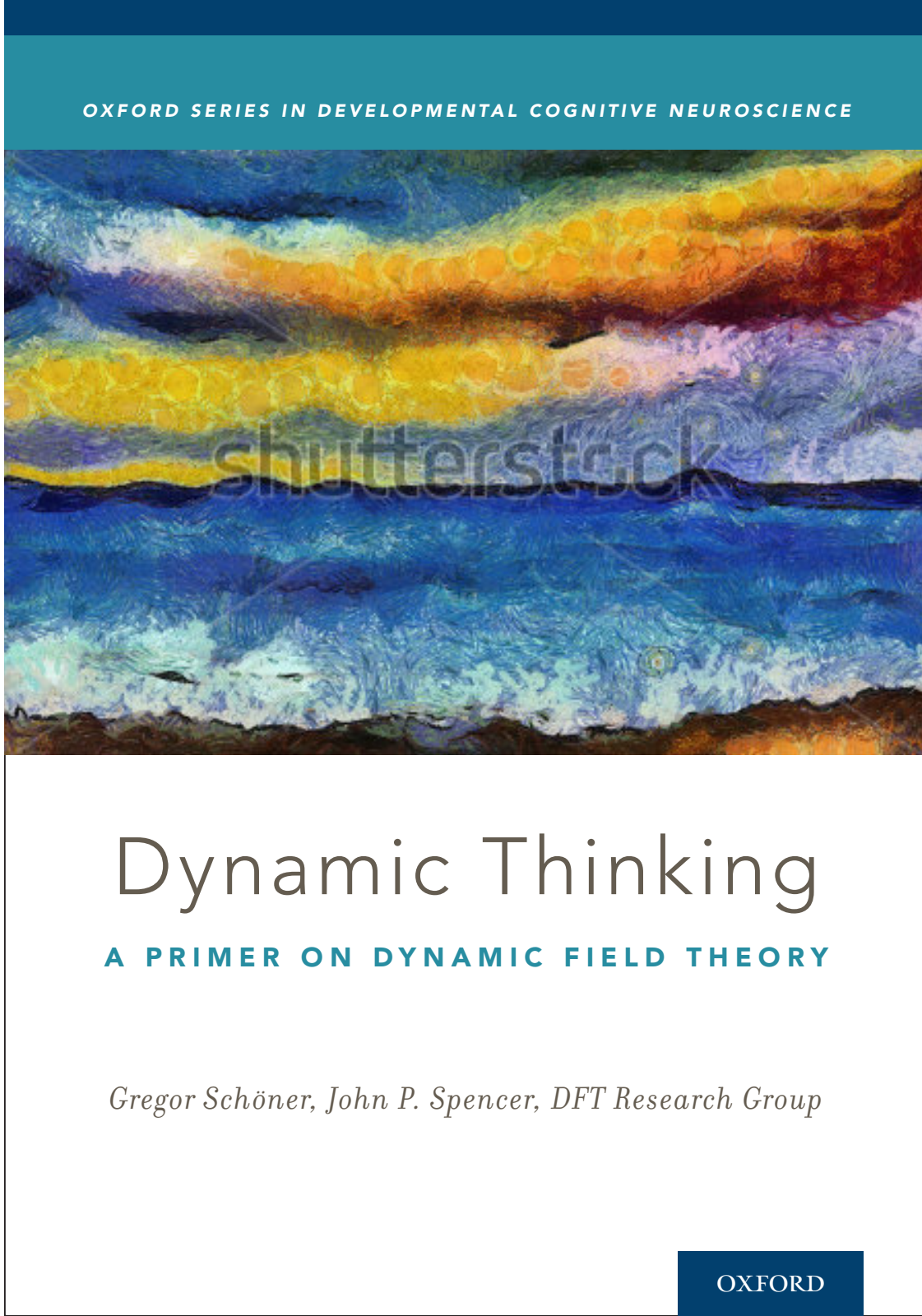
- I'll insert tutorials, special units the give background you might be missing… in response to feedback from you, e.g.
  - mathematical concepts like nonlinear dynamics and instabilities
  - neuroscience background like fundamentals of neurophysics, neuroanatomy, neurophysiology
  - cognitive science background like connectionism vs. information process, symbolic computation etc.
- this may be useful for Cog Sci students!
- => talk to me or Mathis !

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..

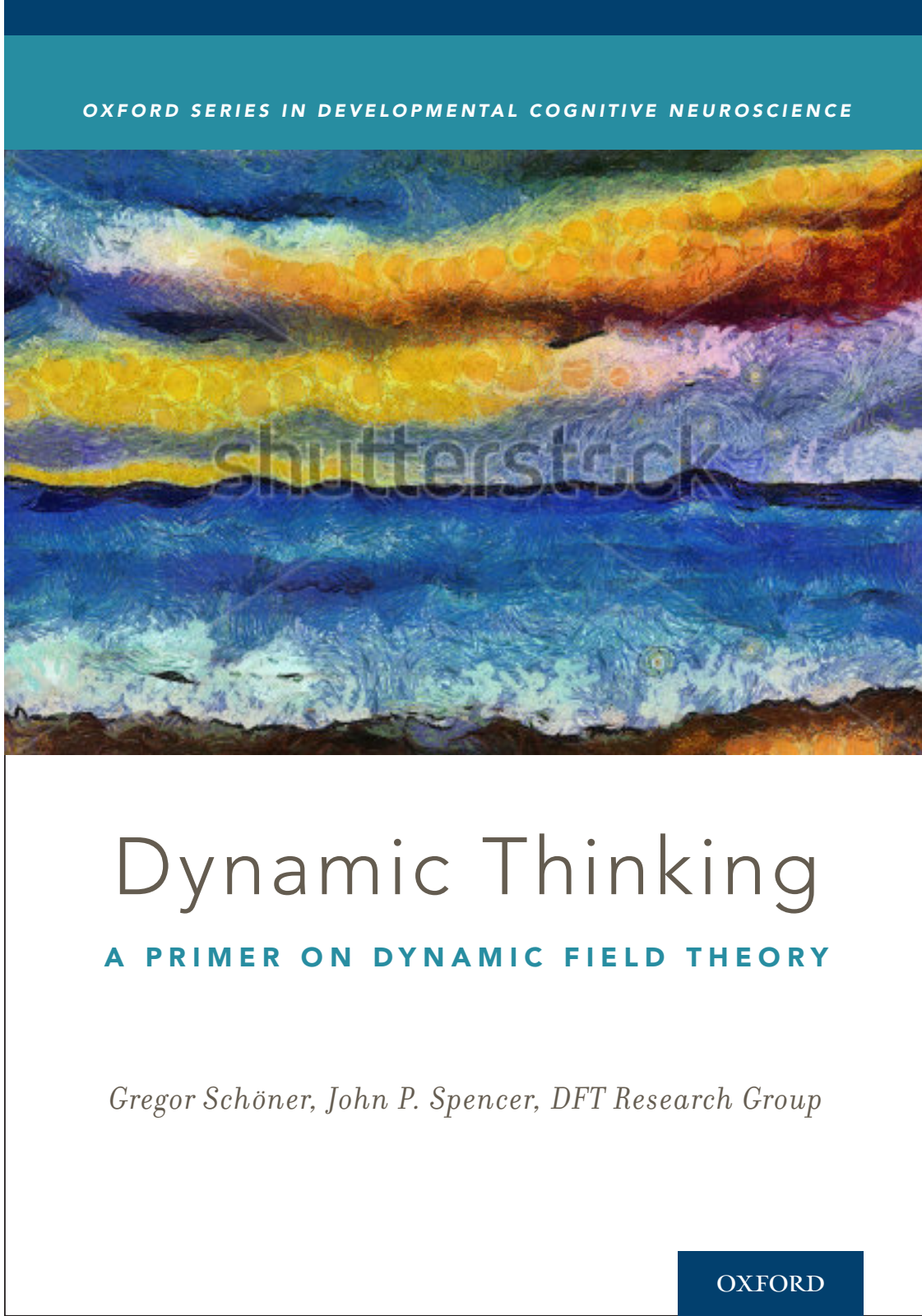
Script/text book

- We will be following in part a book



Script/text book

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



Script/text book

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