



Basic Neuroscience for Organisational Research and Economics

Prof. Dr. Claudia Peus
Dr. Franziska Emmerling
Technische Universität München
TUM School of Management

*Postgraduate Seminar
TUM Graduate School of Management
Summer term 2019*

I. Seminar Description

This seminar aims at teaching the basics of cognitive neuroscience and how it is applied more or less meaningfully in management and organisational research. We will specifically focus on non-invasive brain stimulation, electroencephalogram, and functional Magnetic Resonance Imaging. Graduate students will be enabled to understand these methods, successfully read respective papers and their method section, and to assess the potential as well as the pitfalls of neuroscientific methods in their fields of research.

II. Seminar Objectives

At the end of the seminar graduate students will be able:

1. ...to evaluate if, when, and how it is meaningful to include neuroscientific methods into the methodology of organisational research.
2. ... to debate the pros and cons of neuroscience in behavioural science.
3. ... to understand what non-invasive brain stimulation is and does, as well as to easily read any brain stim paper (including the methods section).
4. ... to understand what electroencephalogram is and does, as well as to easily read any electroencephalogram paper (including the methods section).
5. ... to understand what functional Magnetic Resonance Imaging (fMRI) is and does, as well as to easily read any fMRI paper (including the methods section).
6. ... to familiarise themselves with concrete empirical examples of neuroscientific studies the field of organisational research and behavioural economics and the debates those studies triggered in their respective fields.

The seminar objectives will be achieved by: attending and participating actively in class; reading and discussing the assigned materials; and drafting an oral presentation including slides and hand-outs for one specific paper.

III. Sessions and didactic elements

The seminar will include four sessions (first session a 4.5 hours, three further sessions a 6 hours).

Session I: *The why and when in social neuroscience*

During this session, we will discuss when and why it can be useful to apply neuroscientific methodology to behavioural science. We will unravel the empirical potential of neuroscientific methodologies, while not neglecting their limitations. The session will include ppt-Input from the course instructor, group discussion, and a panel debate.

During our first session, we will, furthermore, decide together who will present which methodological and empirical literature for the focus-sessions and other organisational questions.

Session II: *Focus non-invasive brain stimulation*

During this session, we will focus on various forms of non-invasive brain stimulation (in particular Transcranial Magnetic Brain Stimulation and transcranial Current Stimulation). First, we will discuss the method, how it works, the various ways of using it, (dis)advantages, and its risks. We will figure out, how to fruitfully read a paper, which employs non-invasive brain stimulation, without being experts on non-invasive brain stimulation. The afternoon will be dedicated to an in-depth discussion of three empirical papers which employ non-invasive brain stimulation to illuminated egoistic versus altruistic economic decision making.

Session III: *Focus functional Electroencephalogram*

During this session, we will focus on Electroencephalogram (EEG). First, we will discuss the method, how it works, the various ways of analysing EEG data, (dis)advantages, and its risks. We will figure out, how to fruitfully read a paper, which employs EEG, without being experts on EEG. The afternoon will be dedicated to an in-depth discussion of three empirical papers which employ EEG to illuminated leadership.

Session IV: *Focus functional Magnetic Resonance Imaging*

During this session, we will focus on functional Magnetic Resonance Imaging (fMRT). First, we will discuss the method, how it works, the various ways of analysing fMRI data, (dis)advantages, and its risks. We will figure out, how to fruitfully read a paper, which employs fMRI, without being experts on fMRI. The afternoon will be dedicated to an in-depth discussion of three empirical papers which employ fMRI to illuminated managerial negotiation.

IV. Evaluation of Learning

The main delivery is a presentation of ca. 30 minutes on either a methodological or an empirical paper. Graduate students will work on those presentations either on their own or in pairs and they are expected to prepare a) a set of informative and well-designed slides on their topic (no text, but visuals to support their oral presentations) and b) a hand-out for their fellow students which includes all essential information on their topic.

V. Grading Policy

Assuming that the postgraduate students participate regularly and actively in class and prepare well for their presentations, they will receive a certificate, passing the seminar.

VI. Seminar Schedule

Session I: 29.04., 9:30-12:00 & 13:00-15:00, Location (t.b.d.)

Session II: 13.05., 9:00-12:00 & 13:00-16:00, Location (t.b.d.)

Session III: 16.05., 9:00-12:00 & 13:00-16:00, Location (t.b.d.)

Session IV: 20.05., 9:00-12:00 & 13:00-16:00, Location (t.b.d.)

VII. Readings

The following represent a combination of basic method articles describing the essentials of the two neuroscientific methods most widely used in management research and empirical studies, which apply those methods to various management studies and economics. As a courtesy to the participants the articles will be provided as pdf files.

Session I: *The why and when in social neuroscience*

Please read before the first session:

Cacioppo, J. T., Berntson, G. G., Sheridan, J. F., & McClintock, M. K. (2000). Multilevel integrative analyses of human behavior: social neuroscience and the complementing nature of social and biological approaches. *Psychological bulletin*, 126(6), 829.

We will work with two more (surprise-)papers during the session.

Session II: *Focus non-invasive brain stimulation*

Methodological papers

Nitsche, M. A., Cohen, L. G., Wassermann, E. M., Priori, A., Lang, N., Antal, A., ... & Pascual-Leone, A. (2008). Transcranial direct current stimulation: state of the art 2008. *Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation*, 1(3), 206-223.

Hallett, M. (2007). Transcranial magnetic stimulation: a primer. *Neuron*, 55(2), 187-199.

Robertson, E. M., Theoret, H., & Pascual-Leone, A. (2003). Studies in cognition: the problems solved and created by transcranial magnetic stimulation. *Journal of Cognitive Neuroscience*, 15(7), 948-960.

Empirical papers

Knoch, D., Pascual-Leone, A., Meyer, K., Treyer, V., & Fehr, E. (2006). Diminishing reciprocal fairness by disrupting the right prefrontal cortex. *Science*, 312, 829-832.

Strang, S., Gross, J., Schuhmann, T., Riedl, A., Weber, B., & Sack, A. (2014). Be nice if you have to-The neurobiological roots of strategic fairness. *Social cognitive and affective neuroscience*, nsul14.

Gross, J., Emmerling, F., Vostroknutov, A., Sack, A. T. (in press). Manipulation of Pro-Sociality and Rule-Following with Non-invasive Brain Stimulation. *Nature Scientific Reports*.

Session III: *Focus functional Electroencephalogram*

Methodological papers

Teplan, M. (2002). Fundamentals of EEG measurement. *Measurement science review*, 2(2), 1-11.

Chapter 2 (all other Chapters are also very worth reading) of Dickter, C. L., & Kieffaber, P. D. (2013). *EEG methods for the psychological sciences*. Sage.

The complete Pocket Guide to EEG. iMotion. (Disclaimer: This is a document created by a commercial company and, thus, highly branded; nevertheless it is helpful to gain a first understanding of EEG)

Empirical papers

Balthazard, P. A., Waldman, D. A., Thatcher, R. W., & Hannah, S. T. (2012). Differentiating transformational and non-transformational leaders on the basis of neurological imaging. *The Leadership Quarterly*, 23(2), 244-258.

Waldman, D. A., Balthazard, P. A., & Peterson, S. J. (2011). Leadership and neuroscience: Can we revolutionize the way that inspirational leaders are identified and developed? *The Academy of Management Perspectives*, 25(1), 60-74.

Hannah, S. T., Balthazard, P. A., Waldman, D. A., Jennings, P. L., & Thatcher, R. W. (2013). The psychological and neurological bases of leader self-complexity and effects on adaptive decision-making. *Journal of Applied Psychology*, 98(3), 393.

Session IV: *Focus functional Magnetic Resonance Imaging*

Methodological papers

Schild, H. (1994). *MRI made easy (...well almost)*. Nationales Druckhaus Berlin, Germany.

Amaro Jr, E., & Barker, G. J. (2006). Study design in fMRI: basic principles. *Brain and cognition*, 60(3), 220-232.

Empirical papers

Caspers, S., Heim, S., Lucas, M. G., Stephan, E., Fischer, L., Amunts, K., & Zilles, K. (2012). Dissociated neural processing for decisions in managers and non-managers. *Plos one*, 7(8), e43537.

Hollmann, M., Rieger, J. W., Baecke, S., Lützkendorf, R., Müller, C., Adolf, D., & Bernarding, J. (2011). Predicting decisions in human social interactions using real-time fMRI and pattern classification. *PLoS One*, 6(10), e25304.

Laureiro-Martínez, D., Brusoni, S., Canessa, N., & Zollo, M. (2015). Understanding the exploration-exploitation dilemma: An fMRI study of attention control and decision-making performance. *Strategic Management Journal*, 36(3), 319-338.