Basic Neuroscience
for Organisational Research and Economics

Course instructors

Name: **Dr. Leidy Y. Cubillos Pinilla**
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Application procedure

Goal and target audience

PhD students interested in acquiring basic knowledge of neuroscience methods

Application process e-mail to leidy.cubillos-pinilla@tum.de

Course aims

What this course is

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.

Course 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.

Preliminary schedule

Session I: 31.07., 9:30-12:00 & 13:00-15:00, Seminarraum Z577, TUM School of Management. Corner Luissenstraße and Arcisstraße, Arcisstraße 21, 80333 München

Session II: 07.08., 9:00-12:00 & 13:00-16:00, Seminarraum Z577, TUM School of Management. Corner Luissenstraße and Arcisstraße, Arcisstraße 21, 80333 München

Session III: 08.08., 9:00-12:00 & 13:00-16:00, Seminarraum Z577, TUM School of Management. Corner Luissenstraße and Arcisstraße, Arcisstraße 21, 80333 München

Session IV: 14.08., 9:00-12:00 & 13:00-16:00, Seminarraum Z577, TUM School of Management. Corner Luissenstraße and Arcisstraße, Arcisstraße 21, 80333 München

Core readings

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.

Session II: *Focus eye-tracking*

Methodological papers

Meißner, M., & Oll, J. (2019). The promise of eye-tracking methodology in organizational research: A taxonomy, review, and future avenues. *Organizational Research Methods*, *22*(2), 590-617

Empirical papers

Gerpott, F. H., Lehmann-Willenbrock, N., Silvis, J. D., & Van Vugt, M. (2018). In the eye of the beholder? an eyetracking experiment on emergent leadership in team interactions. The Leadership Quarterly, 29(4), 523– 532. https://doi.org/10.1016/j.leaqua.2017.11.003 Chen,

Y., Jermias, J., & Panggabean, T. (2012). The role of visual attention on managerial judgment in balanced scorecard performance evaluation: Insights from using eye-tracking device. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1984888

Korczak, J., & Kazmierczak, A. (2017). Discovery of analytical thinking patterns of managers using eye tracking. 2017 Intelligent Systems Conference (IntelliSys). https://doi.org/10.1109/intellisys.2017.8324229

Session III: *Focus 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.

Tivadar, R. I., & Murray, M. M. (2019). A primer on electroencephalography and event-related potentials for organizational neuroscience. *Organizational Research Methods, 22*(1), 69-94.

Empirical papers

Zaro, M. A., Fagundes, L. D. C., Rocha, F. T., & Nunes, W. C. (2016). Cognitive brain mapping used in the study of entrepreneurial behavior–pilot test with the use of electroencephalogram–EEG during the process of identification of business opportunities. American Journal of Educational Research, 4(6), 472-478.

De Holan, P. M., & Couffe, C. (2017). Unpacking neuroentrepreneurship: Conducting entrepreneurship research with EEG technologies. In *Handbook of research methodologies and design in neuroentrepreneurship* (pp. 94119). Edward Elgar Publishing.

Dharmawan, B., Rosyad, A., Mandamdari, A. N., Zulkifli, L., & Silitonga, L. M. (2021, February). Assessing the emerging agribusiness entrepreneurs by using brainwave technology. In *IOP Conference Series: Earth and Environmental Science* (Vol. 653, No. 1, p. 012144). IOP Publishing.

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.

Loued-Khenissi, L., Döll, O., & Preuschoff, K. (2019). An Overview of Functional Magnetic Resonance Imaging Techniques for Organizational Research. *Organizational Research Methods, 22*(1), 17-45.

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.

Course procedures

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 eye-tracking
During this session, we will focus on eye-tracking. 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 eyetracking, without being experts on eye-tracking. The afternoon will be dedicated to an in-depth approach of how to use eye-tracking with hands on.

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 approach of how to use EEG with hands on.

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 approach of how to use fMRI data with hands on.

Assessment

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. 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.