

Elisabeth V. C. Friedrich

Career and Professional Experience

2024

Professor for General Psychology and Neuropsychology

University of Sustainability Vienna, Austria

2024

'Oberassistentin' and Senior Research and Teaching Associate

Neuropsychology & Neuroscience, Dept. Psychology, University of Zurich Zurich, Switzerland

2016 - 2024

'Privatdozentin' and Postdoctoral Researcher focusing on Social Cognition

Biological Psychology, Dept. Psychology, Ludwig-Maximilians-University Munich, Germany

2014 - 2016

Senior Consultant focusing on Neuromarketing and Psychological Research

Facit Media Efficiency/Facit Research GmbH & Co. KG Munich, Germany

2013 - 2014

Postdoctoral Researcher focusing on Cognitive Psychology and Neuroscience

Cognitive Neuroscience Lab, Dept. Cognitive Science, University of California San Diego, USA

2008 - 2012

Scientific Employee focusing on Neuropsychology and Neurotechnology

Neuropsychology, Inst. of Psychology, University of Graz Graz, Austria

Brain-Computer Interfaces, Inst. of Knowledge Discovery, Graz University of Technology

2006 - 2007

Master's Student exploring Brain-Computer Interface

Lab of Neural Injury and Repair, Wadsworth Center Albany, NY, USA

Education and Degrees

2023

Venia Legendi for Psychology ('Privatdozentin')

Ludwig-Maximilians-University Munich, Germany

2022

Habilitation for Psychology (Dr. habil.)

Ludwig-Maximilians-University Munich, Germany

2012

Dr.rer.nat. in Psychology

University of Graz Graz, Austria

2005 - 2008

Training in Psychotherapy ('Psychotherapeutisches Propädeutikum')

University of Graz & Medical University of Graz Graz, Austria

2007

Mag.rer.nat. in Psychology

University of Graz Graz, Austria

List of Publications – Elisabeth V. C. Friedrich

Peer-reviewed Journal Publications - Original Data

- Peylo C, Sterner E, Zeng Y, EMPRA students, **Friedrich EVC** (2023). TMS-induced inhibition of the left premotor cortex modulates illusory social perception. *iScience* 26, 1 - 17, doi: 10.1016/j.isci.2023.107297.
- **Friedrich EVC**, Zillekens IC, Biel AL, O'Leary D, Singer J, Seegenschmiedt EV, Sauseng P, Schilbach L (2023). Spatio-temporal dynamics of oscillatory brain activity during the observation of actions and interactions between point-light agents. *European Journal of Neuroscience*, 1-23, doi: 10.1111/ejn.15903.
- **Friedrich EVC**, Zillekens IC, Biel AL, O'Leary D, Seegenschmiedt EV, Singer J, Schilbach L, Sauseng P (2022). Seeing a Bayesian ghost: Sensorimotor activation leads to an illusory social perception. *iScience* 25, 1 - 16, doi: 10.1016/j.isci.2022.104068.
- Peylo C, **Friedrich EVC**, Minarik T, Biel AL, Sauseng P (2022). Theta:Gamma Phase Coupling and Evoked Gamma Activity Reflect the Fidelity of Mental Templates during Memory Matching in Visual Perception. *Cerebral Cortex* 00, 1 - 16, doi: 10.1093/cercor/bhab472.
- **Friedrich EVC**, Berger B, Minarik T, Schmid D, Peylo C, Sauseng P (2019). No enhancing effect of fronto-medial tDCS on working memory. *Journal of Cognitive Enhancement* 3, 416 - 424, doi: 10.1007/s41465-019-00136-5.
- Minichino A, Singh F, Pineda J, **Friedrich E**, Cadenhead K (2016). Biological Motion induced mu suppression is reduced in Early Psychosis (EP) patients with active negative symptoms and Autism Spectrum Disorders (ASD). *Psychiatry Research* 238, 374 - 377, doi: 10.1016/j.psychres.2016.01.057.
- **Friedrich EVC**, Sivanathan A, Lim T, Suttie N, Louchart S, Pillen S, Pineda JA (2015). An effective neurofeedback intervention to improve social interactions in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders* 45, 4084 - 4100, doi: 10.1007/s10803-015-2523-5.
- Scherer R, Faller J, **Friedrich EVC**, Opisso E, Costa U, Kübler A, Müller-Putz GR (2015). Individually adapted imagery improves brain-computer interface performance in end-users with disability. *PLOS ONE* 10(5), e0123727, doi:10.1371/journal.pone.0123727.
- Faller J, Scherer R, **Friedrich EVC**, Costa U, Opisso E, Medina J, Müller-Putz GR (2014). Non-motor tasks improve adaptive brain-computer interface performance in users with severe motor impairment. *Frontiers in Neuroscience* 8 (320), doi: 10.3389/fnins.2014.00320.
- Kober S, Wood G, Kurzmann J, **Friedrich EVC**, Stangl M, Wippel T, Våljamäe A, Neuper C (2014). Near-infrared spectroscopy based neurofeedback training increases specific motor imagery related cortical activation compared to sham feedback. *Biological Psychology* 95, 21 – 30, doi: 10.1016/j.biopsycho.2013.05.005.
- **Friedrich EVC**, Scherer R, Neuper C (2013). Whatever works: A systematic user-centered training protocol to optimize brain-computer interfacing individually. *PLOS ONE* 8 (9), e76214, doi: 10.1371/journal.pone.0076214.
- **Friedrich EVC**, Scherer R, Neuper C (2013). Long-term evaluation of a 4-class imagery-based brain-computer interface. *Clinical Neurophysiology* 124, 916 – 927, doi: 10.1016/j.clinph.2012.11.010.
- **Friedrich EVC**, Scherer R, Neuper C (2013). Stability of event-related (de-) synchronization during brain-computer interface-relevant mental tasks. *Clinical Neurophysiology* 124, 61 – 69, doi: 10.1016/j.clinph.2012.05.020.

List of Publications – Elisabeth V. C. Friedrich

- **Friedrich EVC**, Scherer R, Neuper C (2012). The effect of distinct mental strategies on classification performance for brain-computer interfaces. *International Journal of Psychophysiology* 84, 86 – 94, doi: 10.1016/j.ijpsycho.2012.01.014.
- **Friedrich EVC**, Scherer R, Sonnleitner K, Neuper C (2011). Impact of auditory distraction on user performance in a brain-computer interface driven by different mental tasks. *Clinical Neurophysiology* 122, 2003 – 2009, doi: 10.1016/j.clinph.2011.03.019.
- **Friedrich EVC**, McFarland DJ, Neuper C, Vaughan TM, Brunner P, Wolpaw JR (2009). A Scanning Protocol for a Sensorimotor Rhythm-Based Brain-Computer Interface. *Biological Psychology* 80, 169 – 175, doi: 10.1016/j.biopsycho.2008.08.004.

Peer-reviewed Journal Publications - Reviews, Opinions, Editorials

- **Friedrich EVC**, Neuper C, Scherer R (2023). Editorial: Mind over brain, brain over mind: cognitive causes and consequences of controlling brain activity - Volume II. *Frontiers in Human Neuroscience* 17, doi: 10.3389/fnhum.2023.1280095.
- **Friedrich EVC** (2020). Designing a Successful Neurofeedback Training for Children with Autism Spectrum Disorder. *Lernen und Lernstörungen* 9, 175 - 185, doi: 10.1024/2235-0977/a000303.
- Biel AL, **Friedrich EVC** (2018). Why You Should Report Bayes Factors in Your Transcranial Brain Stimulation Studies. *Frontiers in Psychology* 9 (1125), 1 - 4, doi: 10.3389/fpsyg.2018.01125.
- Sauseng P, Peylo C, Biel AL, **Friedrich EVC**, Romberg-Taylor C (2018). Does cross-frequency phase coupling of oscillatory brain activity contribute to a better understanding of visual working memory? *British Journal of Psychology* 110 (2), 245 - 255, doi: 10.1111/bjop.12340.
- Pineda JA, **Friedrich EVC**, LaMarca K (2014). Neurorehabilitation of social dysfunctions: A model-based neurofeedback approach for low and high-functioning autism. *Frontiers in Neuroengineering* 7 (29), doi: 10.3389/fneng.2014.00029.
- **Friedrich EVC**, Suttie, N, Sivanathan, A, Lim, T, Louchart, S, Pineda, JA (2014). Brain-computer interface game applications for combined neurofeedback and biofeedback treatment for children on the autism spectrum. *Frontiers in Neuroengineering* 7 (21), doi: 10.3389/fneng.2014.00021.
- **Friedrich EVC**, Wood G, Scherer R, Neuper C (2014). Mind over brain, brain over mind: cognitive causes and consequences of controlling brain activity. *Frontiers in Human Neuroscience* 8, 348, doi: 10.3389/fnhum.2014.00348.
- Ninaus M, Kober SE, **Friedrich EVC**, Dunwell I, de Freitas S, Arnab S, Ott M, Kravcik M, Lim T, Louchart S, Bellotti F, Hannemann A, Thin AG, Berta R, Wood G, Neuper C (2014). Neurophysiological methods for monitoring brain activity in serious games and virtual environments: A review. *International Journal of Technology Enhanced Learning* 6, 78 – 103, doi: 10.1504/IJTEL.2014.060022.
- Scherer R, Faller J, Balderas D, **Friedrich EVC**, Pröll M, Allison B, Müller-Putz G (2013). Brain-computer interfacing: more than the sum of its parts. *Soft Computing* 17, 317 – 331, doi: 10.1007/s00500-012-0895-4.

List of Publications – Elisabeth V. C. Friedrich

Peer-reviewed Books and Book Chapters

- Courellis HS, Courelli AS, **Friedrich EVC**, Pineda JA (2019). Using a Novel Approach to Assess Dynamic Cortical Connectivity Changes Following Neurofeedback Training in Children on the Autism Spectrum. In: Oberman LM, Enticott PG, editors. *Neurotechnology and Brain Stimulation in Pediatric Psychiatric and Neurodevelopmental Disorders*. London, San Diego, Cambridge, Oxford: Academic Press, pp. 253 - 276, doi: 10.1016/B978-0-12-812777-3.00011-8.
- Kober SE, Ninaus M, **Friedrich EVC**, Scherer R (2018). BCI and Games: Playful, Experience-Oriented Learning by Vivid Feedback? In: Nam CS, Nijholt A, Lotte F, editors. *Brain-Computer Interfaces Handbook, Technological and Theoretical Advances*. Boca Raton, London: CRC Press Taylor & Francis Group, pp 207 – 232, doi: 10.1201/9781351231954-11.
- Scherer R, Müller-Putz G, **Friedrich EVC**, Pammer-Schindler V, Wilding K, Keller S, Pirker J (2015). Games for BCI Skill Learning. In: Nakatsu R, Rauterberg M, Ciancarini P, editors. *Handbook of Digital Games and Entertainment Technologies*. Singapore: Springer, pp.1 - 19. doi: 10.1007/978-981-4560-52-8_6-1.
- **Friedrich EVC**, Wood G, Scherer R, Neuper C, editors (2015). *Mind over brain, brain over mind: cognitive causes and consequences of controlling brain activity*. Lausanne: Frontiers Media, pp 7 - 8, doi: 10.3389/978-2-88919-663-0.
- **Friedrich EVC**, Scherer R, Neuper C (2013). User-appropriate and robust control strategies to enhance brain-computer interface performance and usability. In: Guger C, Allison BZ, Edlinger G, editors. *Springer Briefs in Electrical and Computer Engineering: Brain-Computer Interface Research: A State-of-the-Art Summary*. Heidelberg New York Dordrecht London: Springer, pp. 15 – 23, doi: 10.1007/978-3-642-36083-1.
- Ninaus M, Witte M, Kober SE, **Friedrich EVC**, Kurzmann J, Hartsuiker E, Neuper C, Wood G (2013). Neurofeedback and Serious Games. In: Connolly TM et al., editors. *Psychology Pedagogy and Assessment in Serious Games*. Hershey PA: IGI Global, pp. 82 - 110, doi: 10.4018/978-1-4666-4773-2.ch005.
- Scherer R, **Friedrich EVC**, Allison B, Pröll M, Chung M, Cheung W, Rao RPN, Neuper C (2011). Non-invasive Brain-Computer Interfaces: Enhanced Gaming and Robotic Control. In: Cabestany J, Rojas I, Joya G, editors. *Advances in Computational Intelligence, Lecture Notes in Computer Science 6691*. Berlin Heidelberg: Springer, pp. 362 - 369. doi: 10.1007/978-3-642-21501-8_45.

Textbook Contributions

- Biopsychologie. Pinel JPJ., Barnes SJ, Pauli P, Gamer M, editors. 11. Auflage, 2024, Pearson.

List of Publications – Elisabeth V. C. Friedrich

Conference Proceedings

- **Friedrich EVC**, Courellis H, Tonnesen AL, Gevirtz R, Pineda JA (2014). Is heart rate variability a predictor for neurofeedback effects? In: Müller-Putz GR, Bauernfeind G, Brunner C, Steyrl D, Wriessnegger S, Scherer R, editors. Proceedings of the 6th International Brain-Computer Interface Conference. Graz 2014, doi: 10.3217/978-3-85125-378-8-22.
- Ninaus M, Kober SE, **Friedrich EVC**, Neuper C, Wood G (2014). The potential use of neurophysiological signals for learning analytics. In: 6th International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES) 2014, pp.1 - 5, doi: 10.1109/VS-Games.2014.7012169.
- **Friedrich EVC**, Scherer R, Pineda JA, Neuper C (2013). Individual Selection of Mental Tasks and Frequency Bands Boosts Performance in a 4-Class Brain-Computer Interface. In: Millán JdR, Gao S, Müller-Putz GR, Wolpaw JR, Huggins JE, editors. Proceedings of the Fifth International Brain-Computer Interface Meeting: Defining the Future. Monterey, California, USA, 2013, pp. 276 - 277.
- Seeber M, **Friedrich EVC**, Jehna M, Müller-Putz G, Scherer R (2012). Non-invasive functional mapping of brain activity. In: Österreichische Gesellschaft für Neurologie (ÖGN): NeuroLogisch Supplementum 1/2012, Poster 52 S. 55.
- Faller J, Vidaurre C, **Friedrich EVC**, Costa U, Opisso E, Median J, Neuper C, Müller-Putz G, Scherer R (2012). Automatic adaptation to oscillatory EEG activity in spinal cord injury and stroke patients. In: Proceedings of the 3rd TOBI Workshop. Würzburg 2012, pp. 12 - 13.
- **Friedrich EVC**, Scherer R, Faller Josef, Neuper C (2011). Do user-related factors of motor impaired and able-bodied participants correlate with classification accuracy? In: Müller-Putz GR, Scherer R, Billinger M, Kreiling A, Kaiser V, Neuper C, editors. Proceedings of the 5th International Brain-Computer Interface Conference. Graz 2011, pp. 156 - 159.
- Kleih SC, Riccio A, Mattia D, Kaiser V, **Friedrich EVC**, Scherer R, Müller-Putz G, Neuper C, Kübler A (2011). Motivation Influences Performance in SMR-BCI. In: Müller-Putz GR, Scherer R, Billinger M, Kreiling A, Kaiser V, Neuper C, editors. Proceedings of the 5th International Brain-Computer Interface Conference. Graz 2011, pp. 108 - 111.
- **Friedrich EVC**, Scherer R, Neuper C (2011). A 4-class brain-computer interface driven by mental strategies evaluated with and without user distraction. In: Proceedings of the Fourth International Brain-Computer Interface Meeting. Monterey California, USA, 2010, p1.
- **Friedrich EVC**, Scherer R, Neuper, C (2010). Consistency over time and across tasks of brain-computer interface-relevant mental strategies. In: Proceedings of the 1st TOBI Workshop 2010. Graz 2010, p. 68.
- Scherer R, **Friedrich EVC**, Rao RP, Neuper C (2010). Beyond motor imagery: Evaluation of mental strategies for stable multi-class classification, In: Proceedings of the 1st TOBI Workshop 2010. Graz 2010, p. 69.
- **Friedrich EVC**, McFarland DJ, Neuper C, Vaughan TM, Brunner P, Wolpaw JR (2008). Sequential Selection in a Sensorimotor Rhythm-Based Brain-Computer Interface. In: Müller-Putz GR, Brunner C, Leeb R, Pfurtscheller G, Neuper C, editors. Proceedings of the 4th International Brain-Computer Interface Workshop and Training Course. Graz, Austria, 2008, pp. 156 - 161.