

Narrative CV

(a) academic profile (1200 words)

I study how memory reprocessing during sleep contributes to the formation of lasting memories. I have performed much research regarding the neurotransmitters that are involved in this process and have developed an expertise for neuropsychopharmacology. I am an expert research polysomnographer (sleep EEG). Currently, I am incorporating more neuroscientific methods into my portfolio and have performed or supervised studies using fMRI and MEG. A lot of my behavioural work uses standard memory tasks. However, I am convinced that developing novel behavioural paradigms to understand sleep and memory is necessary and for this fast prototyping in online experiments has been the key. I predict sleep's role for memory is a key mediator of mental health issues. My group is currently studying this relationship in substance use disorder with the goal of identifying sleep related processes that contribute to its development, maintenance and therapy. However, changes in sleep behaviour as well as memory deficits are ubiquitous in mental disorders and thus I plan to extend my research to other disorders in the near future. Ideally, I would augment my experimental research by collecting a screening polysomnogram as a standard examination in all patients admitted to CIMH.

I have been awarded the prestigious Emmy-Noether-Grant (1.6 million €, 2019 – 2024) by the German Research Foundation that has allowed me to build my own research group to start fulfilling the vision stated above. I was also awarded a research stipend (200 thousand €, 2016 – 2018) by the German Research Foundation that allowed me to make first steps into independence and experience the science system of the UK. I received two smaller grants (17 thousand € total, 2019 and 2021) from the Fritz Thyssen Foundation that allowed me to organize workshops for the Sleep, Oscillations and Memory Network (SOMNet). I have also received awards for early career researchers from the German Society for Psychophysiology and its Application, the German Diabetes Society and the American College for Neuropsychopharmacology. I am a fellow (class of 2018/2019) of the Wissenschaftskolleg zu Berlin.

I am a psychologist by training, but have always worked interdisciplinary. During my PhD, I worked in the Medical Faculty and performed research that spanned psychology, biology and medicine. Already during my PhD, I switched institutions together with my supervisor from the University of Lübeck to the University of Tübingen. During my postdoc, I moved to the Institute of Behavioural Neuroscience at University College London, where there is a strong focus on connecting human and animal neuroscience. Next, I was granted a fellowship by the Wissenschaftskolleg zu Berlin a transdisciplinary centre for advanced studies. My current position at the Central Institute for Mental Health (CIMH) is again distinguished by interdisciplinary work. In addition, I have established a new interdisciplinary collaboration with the Institute of Sports and Sports Sciences at University of Heidelberg. Therefore although I remain foremost a psychologist with strong training in the scientific method, I have demonstrated that my work is firmly transdisciplinary in nature and I intend to leverage this combination to perform robust and exciting research.

By moving between different institutions in Germany and internationally, I have experienced how supervisors, institutions and culture can affect science. This grants me several

advantages. First, it allows me to make informed choices about my leadership style and how it will affect motivation and quality of research outputs of my team. Second, I can contribute knowledge of successful research processes used by institutions outside of the CIMH. Third, I can draw from my experience to identify culturally specific barriers to good research. Fourth, I have ongoing collaborations with researchers at UCL (Profs. Spiers and Dolan).

I strongly believe that high research quality can only be achieved with scientific practices that enhance the robustness and openness of research. In my field, I see three most relevant areas of improvement: 1. the power to detect effects must be increased, 2. preregistration must be used to clearly separate confirmatory and exploratory results and 3. the connection between theory and experimental methods must be more firmly established. My research group has established operating procedures that enable us to address all these areas of improvement. In addition, we use electronic resources (GitHub, OSF, R-Markdown etc.) to perform research in an open and reproducible way. Enhancing reliability of basic research in this way leads to robust results that have much higher likelihood of successful translation into applied scenarios.

My engagement for open and reproducible science goes beyond my own research. Together with other researchers and with support from the director of the CIMH I have founded the Open Science office at the CIMH. We have monthly meetings to discuss how to make doing open and reproducible science at CIMH easy and the norm. One of the first steps was to develop an Open Science Strategy for the entire CIMH that covers the pillars infrastructure, knowledge and incentives. The Open Science Office has started implementing this strategy, e.g., we have launched a survey to ask about infrastructure needs for open science, we have a monthly colloquium and the CIMH has recently joined the German Reproducibility Network (GRN). Beyond my own institution, I have founded the Interest Group for Open and Reproducible Science in the Biological Psychology Section of the German Psychological Society. I have also recently been elected to the steering committee of the GRN, where I am engaged in building this important network.

I am an active member of the scientific community and regularly attend national and international conferences to present my scientific findings to a broad audience. I have chaired symposia at those conferences and I have been invited to give talks at renowned national and international schools of higher learning (e.g., University of Pennsylvania, University College London, University of Oxford and University of Cologne). I have given symposia talks and presented posters at major national and international conferences. I have given keynote lectures at conferences (Scholar Minds Online Conference and Open Science Day of the University of Mannheim). I have been invited to several panel discussions for my expert opinion (Open Science Symposium at Durham University, symposium on the Future and Diversity of Psychotherapy in Osnabrück, the early career researcher meeting at the Psychology and Brain, the biannual meeting of the German Psychological Society). I have been interviewed by national and international news (e.g., Nature News, Zeit online, dpa, Deutschlandfunk). I am also active in science communication (e.g., blogging for In-Mind Germany and >2000 follower in twitter).

During my PhD and my Postdoc, I was very active in promoting early career issues in my field and psychology as a whole in Germany. As the elected early career representative in several scientific societies, I organized retreats, workshops, panel discussions and wrote position papers. Recently I have extended my work to international organisations and have

been appointed to the Awards Committee of the Society for the Improvement of Psychological Science. In addition, I have founded SOMNet a network of senior post-docs and early PIs with members from Germany, the Netherlands, the United Kingdom and the United States. I have recently been appointed to a task force of the German Science Foundation (DFG) to discuss consequences from the corona pandemic.

(b) description of key output of the years 2020-now (700 words)

1. Lonsdorf TB, Hartwigsen G, Kübler A, Merz CJ, Schmidt B, Sperl MF, & **Feld, GB** (2022). Mehr als nur fragwürdig: Reproduzierbarkeit und Open Science in der Lehre aus Sicht der Biologischen Psychologie und Neuropsychologie. *Psychologische Rundschau*, 73, 30-33.

In this commentary, we argue that open and reproducible science methods must be taught already to students. I am the senior author on this paper that was part of a discussion forum initiated by the PsyFaKo (the Association of German Psychology Student Bodies).

2. Gerchen MF, Kirsch P, & Feld GB (2021). Brain-Wide Inferiority and Equivalence Tests in fMRI Group Analyses: Selected Applications. *Human Brain Mapping*, 42(18), 5803-5813.

In this work, we show how effect sizes and their confidence intervals can be used to better understand brain imaging data. I had the idea for this work, was involved in developing the methods and am the senior author. The method has already been used several times by other authors and we have received much encouraging feedback.

3. Feld GB, Bernard, M, Rawson A, & Spiers HJ. (2021). Learning graph networks: sleep targets highly connected global and local nodes for consolidation. *bioRxiv*. doi: 10.1101/2021.08.04.455038

This preprint (now accepted to Scientific Reports) displays our development of a novel behavioural paradigm that will allow us to investigate memory processing during sleep in much more detail. It follows the new trend of using graph networks to structure behavioural tasks and I believe this method will gain sustained momentum.

4. Feld GB, & Born J (2020). Neurochemical Mechanisms for Memory Processing during Sleep: Basic Findings in Humans and Neuropsychiatric Implications. *Neuropsychopharmacology*, 45(1), 31-44.

This review discusses the neurotransmitters involved in memory processing during sleep and explains how deficits in memory processing during sleep may be common symptoms in mental disorders. I wrote and revised the review with Jan Born giving some high-level feedback.

5. Feld GB, Diekelmann S (2020). Building the bridge: outlining steps towards an applied sleep and memory research. *Current Directions in Psychological Science*, 29(6), 554-562.

This opinion paper discusses non-invasive applications to enhance memory processing during sleep. We give concrete examples of promising applied research avenues that involve targeted memory reactivation, closed loop stimulation and hypnosis. This output was generated during the first SOMNet meeting.

6. Alizadeh Asfestani M, Brechtmann V, Santiago JCP, Born J, & Feld GB (2020). Consolidation of reward memory during sleep does not require dopaminergic activation. *Journal of Cognitive Neuroscience*, 32(9), 1688-1703.

In this original study, we found evidence that a core idea of selective memory processing during sleep, i.e., that it involves dopamine, is false. This work also contradicts earlier work of ours and is an example of examining the robustness of our theory and of self-correction.

7. Feld GB, Bergmann TO, Alizadeh-Asfestani M, Stuke V, Wriede J-P, Soekadar S, & Born J (2021). Specific changes in sleep oscillations after blocking human metabotropic glutamate receptor 5 in the absence of altered memory function. *Journal of Psychopharmacology*, 35(6), 652-667.

This original study highlights how to delineate confirmatory and exploratory findings. It also shows the sophisticated analysis that can be done with sleep EEG data to identify the role of neurotransmitters during sleep.

8. Feld GB, & Gerchen MF (2022). In search of systems consolidation. *Cognitive Neuroscience*, 1-2.

This comment paper shows that I have gained an international profile as a memory researcher. I was invited by the editor Dr. Scott Slotnick to write this piece and I asked Dr. Gerchen from CIMH to also contribute.

9. Kolibius LD, Born J, & Feld GB (2021). Vast amounts of encoded items nullify but do not reverse the effect of sleep on declarative memory. *Frontiers in Psychology*, 11, 607070.

This original research was preregistered and published with the data available in the supplement. It displays the use of open and reproducible science practices.

10. Feld GB (2022). Zu klein und wenig robust: Kann Hirnforschung wirklich nur mit mehreren Tausend Teilnehmenden gelingen? In-Mind Blog. <https://de.in-mind.org/blog/post/zu-klein-und-wenig-robust-kann-hirnforschung-wirklich-nur-mit-mehreren-tausend>

This is one example of my science outreach. The article discusses the difficulty of performing good neuroscientific research, but remains optimistic that MRI can be informative even with samples smaller than thousands of people. This is one of my contributions to helping the public better understand the CIMH's contributions to science.