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Annex No. 10 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

HABILITATION THESIS REVIEWER'S REPORT

Masaryk University	
Applicant	MUDr. Alena Damborská, Ph.D.
Habilitation thesis	Electrophysiological correlates of both resting-state mental activity and higher brain functions in humans (Methods of scalp and intracerebral electroencephalography)
Reviewer	Prof. Dr. Thomas Koenig
Reviewer's home unit, institution	Translational Research Center, University Hospital of Psychiatry, University of Bern, Switzerland

To the board members of the habilitation committee of Dr. Alena Damborská

Dr. Alena Damborská presents a cumulative habilitation consisting of a total of 14 publications. The papers testify of her transitioning from an independent post-doc researcher conducting her own research to a senior researcher who defines research agendas and supervises rather than conducts studies. All papers heavily rely on the analysis of neurophysiological data, proofing her faculty of using state-of-the-art research techniques that are far outside of the common skills of a clinically trained psychiatrist and putting her in a position that fulfills the requirements of a senior member of an academic institution with leadership functions. Her research activity has a clear scope around disorders of higher-order cognitive, executive, and affective functions and uses an impressive range of data acquisition and analysis techniques that are well-chosen, well-understood, well-applied and well-published. I have no doubts that her so far very successful research career will continue steadily into the future and that this justifies, both as a sign of merit and as a sign of her proper role in academia, accepting her habilitation.

Reviewer's questions for the habilitation thesis defense (number of questions up to the reviewer)

Understanding microstate class A: In two of your papers, you reported a positive association between microstate class A and depression. Now, several later appearing papers (Hanoglu 2022, https://doi.org/10.3389/fnins.2022.798558, Smailovic 2019 10.1016/j.nicl.2019.102046, Musaeus, 2020, 10.1002/brb3.1630) related microstate A to cognitive decline and dementia. Can you see potential links between these findings, what could they be, and what would that imply?

Linking cognition and the motor system: According to Gallaghers (https://doi.org/10.1016/S1364-6613(99)01417-5) proposal, there is what he calls a 'minimal self' that the subject is directly aware of. This sensing supposedly has two dimensions, namely, a sense of ownership (for the way external events affect the subject, how it feels that something is happening to me) and a sense of agency (for the way the subject affects its external world, how it feels when I make something happening). Some of your work has

linked cognitive operations and the motor system in the absence of motor output. How plausible does it seem to you that all cognition that is about the subject's possibilities of causing something in its environment has a motor component and involves the motor system to some degree?

EEG and partial directed coherence: You published a paper that used partial directed coherence (PDC) between local inverse estimates of EEG sources to study spontaneous brain interactions. What are the promises, pitfalls, and obstacles to using such a methodology? What do researchers need to consider when conducting such an analysis and interpreting the outcomes?

Role of EEG and ERPs in psychiatry: Despite all their promises and potential, and despite all the uncertainties doctors are confronted with when treating psychiatric disorders, EEG and ERPs are not part of the clinical assessment of psychiatric patients. What is your explanation for this discrepancy, and what may, in your opinion, remedy this unsatisfying situation?

Conclusion

The habilitation thesis entitled "Electrophysiological correlates of both resting-state mental activity and higher brain functions in humans (Methods of scalp and intracerebral electroencephalography)" by MUDr. Alena Damborská, Ph.D. **fulfills** the requirements expected of a habilitation thesis in the field of Neuroscience.

Date: 15.6.2023 Signature: