

Exponent®
Engineering & Scientific Consulting

Malayka Mottarella, Ph.D.

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Professional Profile

Dr. Mottarella is a cognitive scientist and experimental psychologist with expertise in knowledge development, skill learning, and human performance. She has a strong background in analyzing cognitive processes such as memory, attention, natural language, and behavior in complex skills like computer programming. Dr. Mottarella applies her knowledge to a range of human factors projects, including both incident investigation as well as proactive consulting.

Dr. Mottarella earned her Ph.D. in Psychology from the University of Washington, where her research focused on how individual differences in cognitive abilities affect the learning and performance of complex skills. She also explored how environmental factors and lapses in attention can disrupt these processes. Dr. Mottarella has received multiple grants and awards for her research, which employs various quantitative and qualitative methodologies, including neuroscience techniques such as functional magnetic resonance imaging (fMRI), event-related potentials (ERPs), and spectral analysis of quantitative electroencephalography (qEEG), as well as behavioral experiments, interviews, and surveys. Her work has identified behavioral and neural indices of successful skill acquisition and has demonstrated effects that factors like sleep deprivation and fatigue can have on cognition.

During her graduate studies, Dr. Mottarella interned with the United States Department of Health and Human Services, Office of the Inspector General. There, she worked with diverse stakeholders and applied her research skills to public health issues including evaluating disparities in accessing healthcare, reporting of adverse patient events, oversight regulations relating to medical fraud, and barriers to implementing sanitation infrastructure.

Dr. Mottarella is skilled in designing research studies, conducting statistical analyses, communicating results to a variety of audiences, and collaborating with multidisciplinary teams. She has taught classes and assisted in curriculum development for courses in cognitive psychology, research methods, sensation and perception, psychology of sleep, and general psychology. Dr. Mottarella has authored peer-reviewed publications on how sleep deprivation can impair selective attention, roles of language skills in modulating cognitive control, and neurocognitive factors that drive computer programming skill acquisition. She has also authored a book chapter on using qEEG methods to study second-language learning and bilingualism.

Academic Credentials & Professional Honors

Ph.D., Psychology, University of Washington, 2024

M.S., Psychology, University of Washington, 2022

B.A., Psychology, Willamette University, 2017

University of Washington Auditory Neuroscience Training Grant (NIH T32), 2022-2024

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University of Washington Center for Human Neuroscience Student Technology Grant, 2022

Society for Text and Discourses Graduate Student Research Award, 2020

Willamette University Noel F. Kaestner Award in Psychology, 2017

Academic Appointments

Graduate Teaching Assistant, Psychology, University of Washington, 2019-2023

Publications

Mottarella, M. & Prat, C. S. (2023). Using quantitative electroencephalography (qEEG) to investigate second-language ability. In K. Morgan-Short, & J. van Hell (Eds), The Routledge Handbook of Second Language Acquisition and Neurolinguistics (1st ed.). Routledge. https://doi.org/10.4324/9781003190912

Mottarella, M., Yamasaki, B. L., & Prat, C. S. (2021). Relating individual differences in reading skill to neural indices of proactive control and online filtering during a working memory task. Discourse Processes, 58(5-6), 569-591. https://doi.org/10.1080/0163853X.2021.1926407

Prat, C. S., Madhyastha, T. M., Mottarella, M., & Kuo, C. (2020). Relating natural language aptitude to individual differences in learning programming languages. Scientific Reports, 10, 1-10. https://doi.org/10.1038/s41598-020-60661-8

Wiggins, E., Mottarella, M., Good, K., Eggleston, S., & Stevens, C. (2018). 24-h sleep deprivation impairs early attentional modulation of neural processing: An event-related brain potential study. Neuroscience Letters, 677, 32-36. https://doi.org/10.1016/j.neulet.2018.04.022

Presentations

Mottarella, M., Mortimore, K., & Prat, C. S. (2024, July). Exploring programming aptitude: Comparing the predictive utility of language aptitude subskills for Python and Java learning. Poster presentation at the Annual Meeting of Cognitive Science Society, Rotterdam, Netherlands.

Kuo, C., Mottarella, M., Haile, T., & Prat, C. S. (2022, September). Predicting programming success: How intermittent knowledge assessments, individual psychometrics, and resting-state EEG predict Python programming and debugging skills. International Conference on Software, Telecommunications, and Computer Networks

Mottarella, M. & Prat, C. S. (2022, April). Examining Training-Related Changes in Resting-State EEG Following Second-Language Learning in Adults. Poster presentation given at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA

Mottarella, M., Yamasaki, B., & Prat, C. (2020, July). Skilled Readers Engage More Proactive Attentional Control Processes During a Working Memory Task. Oral presentation given at the Annual Meeting of the Society for Text and Discourses, Virtual.

Mottarella, M. & Prat, C. (2020, May). Understanding the Neurocognitive Mechanisms of Maintenance and Disengagement in a Complex Working Memory Task. Poster presentation given at the Annual Meeting of the Cognitive Neuroscience Society, Virtual.

Prat, C., Zeitlin, M., Mottarella, M., Yamasaki, B., & Madhyastha, T. (2019, March). Relating Individual Differences in Beta Oscillations Recorded at Rest to Second Language Aptitude and Basal Ganglia Signal Routing. Poster presentation given at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA.

Mottarella, M., Prat, C., & Yamasaki, B. (2018, August). Working Memory Filtering and Individual Differences in Second Language Aptitude. Poster presentation given at the Annual Meeting of the Society for Neurobiology of Language, Québec City, Canada.

Mottarella, M., Wiggins, E., Eggleston, S., Good, K., Giuliano, R., & Stevens, C. (2017, March). The effects of 24-hour sleep deprivation on ERP indices of selective attention and working memory. Poster presentation given at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA.

Wiggins, E., Eggleston, S., Mottarella, M., Wolfe, S., Green, R., & Stevens, C. (2016, March). The effects of sleep deprivation on selective attention: An event-related brain potential study. Poster presentation given at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.