CV

Nikita A Novikov

Fields of research: psychophysiology, computational neuroscience, working memory, spiking networks, EEG, neural oscillations, attentional lapses

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Present Position

2014-present **Junior research fellow, Centre for Cognition and Decision Making,** Institute for Cognitive Neuroscience, HSE University, Moscow, Russia.
- Study of the role of neural oscillations in working memory: modelling and analysis of animal recordings (Matlab, Python).
- Development of a brain-computer interface system based on the analysis of sensorimotor EEG rhythms (Matlab; 2014-2015, finished).
- Implementation of experimental paradigm for a working memory study with transcranial alternating current stimulation (E-Prime, control of stimulation using Matlab; 2017-2019, finished).

Positions Previously Held

2013-2015 **Junior research fellow**, **Research and Study Group for Cognitive Psychophysiology**, Faculty of Social Sciences, School of Psychology, HSE University, Moscow, Russia.
- Study of attentional lapses in cognitive tasks: implementation of experimental paradigms (E-Prime), behavioral and spectral EEG data analysis (Matlab, EEGLAB).
- Study of auditory feature binding: implementation of experimental paradigm (NBS Presentation).

2013-2015 **Teaching Assistant, Department of Applied Synergetics,** Moscow State Institute of Radio Engineering, Electronics and Automation, Moscow, Russia.

2012-2013 **Junior research fellow, Department of Algorithm Theory and Coding Mathematical principles,** Institution of Russian Academy of Sciences Dorodnicyn Computing Centre of RAS, Moscow, Russia.
- Development of fast search algorithms based on tree-structured representations of objects and classes (C++, assembler, Matlab).

2007-2013 **Programmer,** Research Institute “Argon”, Moscow, Russia.
- Development of a system for testing hardware on-board video channels (C++).

2006-2007 **Programmer,** APT Telecom, Moscow, Russia.
- Development of a software for integrating IP phone station with call center database (C++, PHP).

Teaching

2015-2020 Higher School of Economics, Moscow, Russia: lectures on Computational Neuroscience, Biophysics part (Master’s programme,

	Faculty of Social Sciences, School of Psychology, programme "Cognitive sciences and technologies: from neuron to congnition")
2014	Higher School of Economics, Moscow, Russia: seminars on Digital Signal Processing and Neuroimaging Techniques (Master's programme, Faculty of Social Sciences, School of Psychology, programme "Cognitive sciences and technologies: from neuron to congnition")
2013-2014	Moscow State Institute of Radio Engineering, Electronics and Automation, Moscow, Russia: seminars on Biosynergetics (topic: modeling of neurons and neural networks)
2012	Moscow State Institute of Radio Engineering, Electronics and Automation, Moscow, Russia: seminars on General Synergetics (topic: chaos in dynamical systems)

Education

Specialist degree (Master equivalent), qualification: engineer, specialty: Biotechnical and Medical Devices and Systems, February 2009, Moscow State Institute of Radio Engineering, Electronics and Automation, Moscow, Russia.
GPA: 4.7/5.0

Advanced Doctoral Programme in the field of psychophysiology, November 2015 – now, National Research University Higher School of Economics, Moscow, Russia.

Schools and courses

- Cajal Course in Computational Neuroscience 2018
- Course on multiscale brain circuit modeling using NetPyNE and NEURON (2021, online)

Certificates

TOEFL iBT, July 2015, Total Score: 107

Languages

Russian – native speaker
English – advanced

Skills

Programming: MATLAB (expert), Python (beginner), C++ (advanced)
Neural network simulation: Brian, XPPAUT
EEG processing: EEGLAB, Brainstorm
Stimulus presentation software: E-Prime, NBS Presentation
EEG registration: NVX52 + Neocortex, BrainVision actiCHamp Recorder / Pycorder
Eye-tracking: SMI Red-M (integration with E-prime)
Transcranial alternating current stimulation: Digitimer DS5 (controlling from Matlab, integration with E-Prime)
Programming (additional): assembler, PHP, JavaScript

Conferences and workshops

Rovereto Attention Workshop 2015
International Conference on Mathematical NeuroScience (ICMNS 2016)

Memory School, part of the Intensive Research Program *Mathematics of Memory* by the Centre de Recerce Matematica, 2017
26th Annual Computational Neuroscience Meeting (CNS 2017)
Analysis and Modelling of Complex Oscillatory Systems (AMCOS 2018)
27th Annual Computational Neuroscience Meeting (CNS 2018)
SfN's 48th Annual Meeting (Neuroscience 2018)
28th Annual Computational Neuroscience Meeting (CNS 2019)
30th Annual Computational Neuroscience Meeting (CNS 2021)

Grants

2017-2019 Russian Science Foundation grant (contract number: 17-11-01273), co-PI

Publications

1. Lange, M., Novikov A. Nikita. Bayes Classifier Based on Tree Structured Gaussian Mixtures // Pattern Recognition and Image Analysis. (Advances in Mathematical Theory and Applications). 2012. Vol. 22. No. 1. P. 136-143. ISSN: 1054-6618
2. N.A. Novikov. Multilevel classifiers based on a tree-structured set of Gaussian densities // Pattern Recognition and Image Analysis. (Advances in Mathematical Theory and Applications). 2014. Vol. 24. No. 3. P. 443-451. ISSN: 1054-6618. doi:10.1134/S1054661814030134
3. B. V. Chernyshev, I. E. Lazarev, D. V. Bryzgalov, N. A. Novikov. Spontaneous attentional performance lapses during the auditory condensation task: an ERP study // Psychology & Neuroscience, 2015, Vol. 8, No. 1, p. 4-18. doi:10.1037/h0101029
4. **N. A. Novikov, D. V. Bryzgalov, B. V. Chernyshev. Theta and alpha band modulations reflect error-related adjustments in the auditory condensation task // Frontiers in Human Neuroscience. 2015. Vol. 9. No. 673. P. 1-23. doi: 10.3389/fnhum.2015.00673**
5. **Nikita A. Novikov, Boris S. Gutkin. Robustness of persistent spiking to partial synchronization in a minimal model of synaptically driven self-sustained activity // Physical Review E. 2016. Vol. 94, No. 5, P. 052313. doi:10.1103/PhysRevE.94.052313**
6. **Nikita A. Novikov, Yulia M. Nurislamova, Natalia A. Zhozhikashvili, Evgenii E. Kalenkovich, Anna A. Lapina, Boris V. Chernyshev. Slow and fast responses: two mechanisms of cognitive control revealed by EEG oscillations // Frontiers in Human Neuroscience. 2017. Vol. 11. No. 218. P. 1-16. doi: 10.3389/fnhum.2017.00218**
7. Novikov N., Gutkin B. Role of beta and gamma oscillations in working memory functions // Psychology. Journal of Higher School of Economics. 2018. Vol. 15, No. 1, P. 174-182 (in Russian). doi: 10.17323/1813-8918-2018-1-174-182
8. Yaple Z., Martinez-Saito M., Novikov N., Altukhov D., Shestakova A., Klucharev V. Power of Feedback-Induced Beta Oscillations Reflect Omission of Rewards: Evidence From an EEG Gambling Study // Frontiers in Neuroscience. 2018. Vol. 18. P. 1-11. doi:10.3389/fnins.2018.00776.
9. Nurislamova Y., Novikov N., Zhozhikashvili N., Chernyshev B. V. Enhanced theta-band coherence between midfrontal and posterior parietal areas reflects post-feedback adjustments in the state of outcome uncertainty // Frontiers in Integrative Neuroscience. 2019. Vol. 13. No. 14. P. 1-14. doi:10.3389/fnint.2019.00014.
10. Ermolova M., Belyaeva V., Novikov N.A., Gutkin B.S., Feurra M., Fedele T. Changes in neuronal oscillations account for working memory dynamics: EEG-tACS study. // Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation. Volume 12, Issue 5, Page e168. 2019. doi:10.1016/j.brs.2019.06.007.
11. Zamani A., Novikov N., Gutkin B. Concomitance of Inverse Stochastic Resonance and Stochastic Resonance in a minimal bistable spiking neural circuit. // Communications in Nonlinear Science and Numerical Simulation. 2020. doi:10.1016/j.cnsns.2019.105024.
12. Rooy M., Novikov N., Gutkin B. Interaction between PFC neural networks ultra-slow fluctuations and brain oscillations // Izvestiya Vysshikh uchebnykh zavedeniy. Prikladnaya nelineynaya dinamika. 2020. Vol. 28. No. 1. P. 90-97. doi: 10.18500/0869-6632-2020-28-1-90-97

13. **Novikov N., Zakharov D., Moiseeva V., Gutkin B. Activity Stabilization in a Population Model of Working Memory by Sinusoidal and Noisy Inputs // Frontiers in Neural Circuits. 2021. 15:647944. doi: 10.3389/fncir.2021.647944**
14. **Novikov N., Gutkin B. Frequency-selective oscillatory control of working memory robustness to distractors // preprint, doi: 10.1101/2020.12.13.422600**

Proceedings

1. N. A. Novikov. Image Segmentation Using Tree-Structured Approximation of Clusters in Multidimensional Feature Space // Collection of entries of the competition of scientific and technical creativity of undergraduate students "Eureka-2009". Lik, 2010. P. 41-43. (In Russian)
2. M. M. Lange, N. A. Novikov. Multidimensional Bayes Classifier Based on Tree-Structured Gaussian Mixtures // Proceedings of 10th International Conference on Pattern Recognition and Image Analysis (PRIA-2010, St. Petersburg, Russia), Vol. 1. Politechnika, 2010. P. 153-156.
3. M. M. Lange, N. A. Novikov. Multilevel Data Representation Submission for Fast Image Gridding // Proceedings of the Scientific-Technical Conference-Seminar "Technical Vision in Systems of Mobile Objects Control 2012". SRI RAS, Moscow, 2012. P. 242-249. ISSN 2075-6836. URL: http://tvcs2012.technicalvision.ru/docs/Abstracts_TVCS-2012.pdf (In Russian)
4. M. M. Lange, N. A. Novikov. Probabilistic Model of Classifier Based on the Tree-Structured Gaussian Mixtures // Mathematical Methods of Pattern Recognition: The 15th All-Russian Conference, Petrozavodsk, 11–17 September 2011: Proceedings. Editor: K. V. Vorontsov. MAKS Press, Moscow, 2012. P. 326-329. (In Russian)
5. M. M. Lange, N. A. Novikov. Fast Image Gridding Based on Hierarchical Search of Reference Fragments // Intellectualization of Information Processing: 9th International Conference. Montenegro, Budva, 2012. Proceedings. Editor: K. V. Vorontsov. Torus Press, Moscow, 2012. P. 362-365. (In Russian)
6. N. A. Novikov. Two-Stage Image Gridding Scheme Based on a Fast Search in the Space of Tree-Structured Representations // Proceedings of the Scientific-Technical Conference "Technical Vision in the Control Systems 2013". P. 132-135. URL: http://tvcs2013.technicalvision.ru/docs/2013_v4.pdf (In Russian)
7. B. V. Chernyshev, I. E. Lazarev, D. V. Bryzgalov, E. S. Osokina, A. S. Antonenko, E. A. Arkhipova, N. A. Novikov. Electrophysiological Manifestations of Attentional Lapses Caused by Mind Wandering // Proceedings of the 6-th International Conference on Cognitive Science. Kaliningrad, 23–27 June 2014. Kaliningrad, 2014. P. 628-629. ISBN 978-9955-488-86-6 (In Russian)
8. D. V. Bryzgalov, I. E. Lazarev, N. A. Novikov, E. A. Arkhipova, A. S. Antonenko, G. R. Khusyainova, B. V. Chernyshev. Electrophysiological Manifestations of Spontaneous Attentional Lapses // Proceedings of the IV Congress of CIS Physiologists. Medicine-Health, Moscow, 2014. P. 72. ISBN 5-94255-017-9. (In Russian)
9. I. E. Lazarev, E. A. Arkhipova, A. S. Antonenko, D. V. Bryzgalov, N. A. Novikov, B. V. Chernyshev. Binding Errors in the Auditory // Proceedings of the IV Congress of CIS Physiologists. Medicine-Health, Moscow, 2014. P. 73. ISBN 5-94255-017-9. (In Russian)
10. B. V. Chernyshev, D. M. Ramendik, I. E. Lazarev, E. S. Osokina, N. A. Novikov. Individual differences in electrophysiological correlates of auditory attention // International Journal of Psychophysiology, 2014, V. 94, #2. Proceedings of the 17th World Congress of Psychophysiology (IOP2014). Page 176-177. doi:10.1016/j.ijpsycho.2014.08.753
11. B. V. Chernyshev, I. E. Lazarev, D. V. Bryzgalov, N. A. Novikov, E. S. Osokina, A. S. Antonenko, E. A. Arkhipova. Electrophysiological Correlates of Spontaneous Attentional Lapses Point to the Preattentive Level Information Processing // Natural-scientific approach in modern psychology, editor: V. A. Barabanshikov. Publishing house “Institute of Psychology of RAS”, Moscow, 2014. ISBN 978-5-9270-0293-1 P. 332-338 (In Russian)
12. N. A. Novikov, D. V. Bryzgalov, A. S. Antonenko, E. A. Arkhipova, B. V. Chernyshev. High pre-stimulus frontal midline theta predicts better task performance // Cognitive control, communication and perception (CCCP): Psychological and neurobiological aspects. HSE Publishing House, Moscow, 2014. P. 39.
13. I. E. Lazarev, D. V. Molchanova, N. A. Novikov, A. S. Antonenko, E. A. Arkhipova, G. R. Khusyainova, B. V. Chernyshev. Prestimulus alpha oscillations as an index of increased cognitive control under the auditory condensation task // Working paper. Series: psychology. WP BRP 28/PSY/2014. Higher School of Economics, Moscow, 2014.

14. N. A. Novikov, D. V. Bryzgalov, B. V. Chernyshev. Prestimulus frontal midline theta reflects increased cognitive control during spontaneous lapses of attention // Working paper. Series: psychology. WP BRP 27/PSY/2014. Higher School of Economics, Moscow, 2014.
15. N. A. Novikov, D. V. Bryzgalov, D. V. Molchanova, B. V. Chernyshev. Condensation Task as an Experimental Model for Studying Individual Differences in Cognitive Control // Cognitive Sciences in Moscow: New Research (16 June 2015), eds.: E. V. Pechenkova, M. V. Falikman, BukiVedi, Moscow, 2015. P. 334-339. (In Russian)
16. B. V. Chernyshev, I. E. Lazarev, N. A. Novikov, D. V. Bryzgalov, G. R. Khusiainova, D. V. Molchanova. Spontaneous Lapses of Attention Affect Preattentive Level of Information Processing // Cognitive Sciences in Moscow: New Research (16 June 2015), eds.: E. V. Pechenkova, M. V. Falikman, BukiVedi, Moscow, 2015. P. 463-468. (In Russian)
17. N. A. Novikov, D. V. Bryzgalov, A. A. Lapina, B. V. Chernyshev. *Condensation task as an experimental model for studying individual differences in cognitive control* // Working papers by HSE Publishing House Series WP BRP "PSYCHOLOGY", 2015, No. WP BRP 56/PSY/2015.
18. D. V. Bryzgalov, I. E. Lazarev, N. A. Novikov, B. V. Chernyshev. Errors in auditory condensation task are preceded by lower prestimulus alpha-band oscillations // *Error Signals from the Brain*. Leipzig: Universität Leipzig, 2015. P. 40-40.
19. B. V. Chernyshev, D. V. Bryzgalov, I. E. Lazarev, N. A. Novikov. Spontaneous attentional lapses are related to a rejection positivity-like ERP shift // *Error Signals from the Brain*. Leipzig: Universität Leipzig, 2015. P. 38-38.
20. I. E. Lazarev, A. S. Antonenko, E. A. Arkhipova, D. V. Bryzgalov, A. A. Lapina, D. V. Molchanova, N. A. Novikov, G. R. Khusiainova, B. V. Chernyshev. Alpha Rhythm as an Indicator of the Level of Cognitive Control in the Auditory Condensation Task // Neuroscience for Medicine and Psychology: 11th International Interdisciplinary Congress, eds. E. Losev, A. Kruchkov, N. Loginova, MAKS Press, Moscow, 2015. P. 243-244. (In Russian)
21. I.E. Lazarev, D.V. Molchanova, N.A. Novikov, B.V. Chernyshev. Alpha Rhythm as an Indicator of the Level of Cognitive Control is Associated with the Power of Alpha Rhythm at Rest // Neuroscience and Well-Being of Society: Technological, Economic, Biomedical and Humanitarian Aspects: Proceedings of the Conference. Printing and Publications Center of Sholokhov Moscow State University for the Humanities, 2015. P. 71-72. (In Russian)
22. Novikov N., Gutkin B. Semi-numerical method for computationally effective analysis of working memory models // 26th Annual Computational Neuroscience Meeting (CNS*2017): Part 2. BMC Neurosci 18, 59 (2017), P89. doi: 10.1186/s12868-017-0371-2
23. Novikov N., Gutkin B. Input oscillations may stabilize working memory activity // 27th Annual Computational Neuroscience Meeting (CNS*2018): Part Two. BMC Neurosci 19, 65 (2018), P36. doi: 10.1186/s12868-018-0451-y
24. Novikov N., Gutkin B.. Mechanisms of working memory stabilization by an external oscillatory input // 28th Annual Computational Neuroscience Meeting: CNS*2019. BMC Neurosci 20, 56 (2019), P111. doi: 10.1186/s12868-019-0538-0
25. Vodorezova K., Novikov N., Gutkin B. Prediction of mean firing rate shift induced by externally applied oscillations in a spiking network model // 28th Annual Computational Neuroscience Meeting: CNS*2019. BMC Neurosci 20, 56 (2019), P112. doi: 10.1186/s12868-019-0538-0