

## **Curriculum Vitae**

### **Person**

Name: Jaan Aru  
Date of birth: 21.11.1984  
Place of birth: Tartu, Estonia  
Nationality: Estonian  
Marital status: married to Mari Aru, two children

### **Education**

2009– 2014 PhD in Max Planck Institute for Brain Research / Goethe University Frankfurt (summa cum laude)  
2004–2008 Diploma studies of psychology at Humboldt University of Berlin (specialization in cognitive neuroscience, elective courses in biology)

### **Positions**

2015 – ... University of Tartu, School of Law, Senior Researcher  
2015 – ... University of Tartu, Institute of Computer Science, Researcher  
2014 – University of Tartu, Institute of Computer Science, Scientific programmer  
2014 – University of Tartu, Institute of Public Law, Specialist  
2008 – 1.5 month Internship at the Estonian Centre for Behavioural and Health Sciences  
2007 – 1.5 month Internship at the Estonian Centre for Behavioural and Health Sciences

### **Awards and scholarships**

2016, First prize in Estonian Science Communication Award  
2015, Barbara Wengeler Prize  
2010, travel grant from Brain Clocks and Rhythms Summer School  
2009-2013, PhD-Scholarship from the Frankfurt Institute for Advanced Studies  
2004, finished the secondary school with the gold medal.  
2004, 7<sup>th</sup> place in the National History Olympiad of Estonia  
2003, 9<sup>th</sup>-10<sup>th</sup> place in the National Mathematical Olympiad of Estonia  
2002, 7<sup>th</sup>-9<sup>th</sup> place in the National Mathematical Olympiad of Estonia

### **5 selected invited talks**

10.2011 – “A few problems with gamma oscillations” for the Department of Psychiatry of the Goethe University Frankfurt  
02.2012 – “Scientific study of consciousness: where do we stand?” for the Institute of Neurobiology, Free University Berlin  
10.2012 – “Distilling the neural correlates of conscious perception” at the Donders Discussions 2012  
02.2014 – “Distilling the neural correlates of conscious perception” Bavarian Academy of Sciences  
05.2017 - “Testing the strange predictions of predictive coding with virtual reality” in Max Planck Institute for Empirical Aesthetics

### **Supervisor experience**

BSc level (19): Kristjan-Julius Laak, Madis Vasser, Anu Einberg, Mihkel Stamm, Henri Ingelman, Taavi Kivisik, Marit Martin, Taivo Pungas, Taavi Gilden, Markus Kängsepp, Kälver Kilvits, Tõnis Sepp,

Kristiina Pokk, Murad Magomedkerimov, Sander Kulu, Vladislav Stafinjak, Oliver Jared Uibopuu, Al Willem Tammsaar, Tõnis Koppel.

MSc level (9): Anu Einberg, Mihkel Stamm, Madis Vasser, Kristjan-Julius Laak, Taavi Kivisik, Taavi Gilde, Aqeel Labash, Zura Isakadze, Kiur Lootus

PhD level (3): Madis Vasser, Ardi Tampuu, Aqeel Labash

### **Teaching**

2007-2010 several tutorials and consultations on EEG analysis in the Department of Psychology and in the Institute of Public Law of the Tartu University

2015/2016 course „Selection of central topics in contemporary brain science“

2014, 2015 and 2016 I have given the lecture about memory networks in the course „Introduction to computational neuroscience“

2015, 2016 and 2017 I have given the introductory lecture to brain science in the course “Introduction to psychology”

2013 faculty of a winter school in Tartu devoted to EEG analysis

2014 faculty of an ERASMUS IP seminar

### **Funding**

I have been part of several projects that have received funding from the Estonian Research Council. In PUT438 and especially PUT1476 I had a substantial role in writing the grant.

#### Finished:

PUT438 "Exploring synaptic memories through biophysical modeling and advanced machine learning (1.01.2014–31.12.2016)", Raul Vicente Zafra, University of Tartu, Faculty of Science and Technology, Institute of Computer Science. (my role: Senior research staff)

SF0180027s12 "Attention and consciousness (1.01.2012–31.12.2013)", Talis Bachmann, University of Tartu, Faculty of Social Sciences and Education. (my role: Senior research staff)

#### Ongoing:

PUT1476 "Bridging biological and artificial models of vision (1.01.2017–31.12.2019)", Raul Vicente Zafra, University of Tartu, Faculty of Science and Technology, Institute of Computer Science. (my role: Senior research staff)

TAR16013 (EXCITE) "Estonian Centre of Excellence in ICT Research (1.09.2016–31.08.2023)", Maarja Kruusmaa, Tallinn University of Technology, School of Information Technologies, Centre for Biorobotics. (my role: Senior research staff)

IUT20-40 "Sources of Resilience: Neurobiology and Development of Cognitive and Affective Processes Crucial for Coping Styles (1.01.2014–31.12.2019)", Jaanus Harro, University of Tartu, Faculty of Social Sciences, Institute of Psychology. (my role: Other research staff)

### **Reviewer experience**

I am a reviewing editor for Frontiers in Robotics and AI. I have reviewed for Journal of Neuroscience, NeuroImage, Journal of Cognitive Neuroscience, Consciousness & Cognition, Frontiers in Psychology, Neuroscience of Consciousness

### **Outreach & science communication**

Since 2012 I have been invited to give popular scientific talks to banks, companies, government agencies and schools. Altogether I have given ca 45 popular scientific talks since 2012. Notably, I have given two TEDx talks and in addition three times presented to an audience of more than 500 people.

I have edited the translations of 6 popular scientific books (e.g. David Eagleman's "Brain: The story of you")

I was the sole author of a science web-log about neuroscience and the scientific study of consciousness with more than 650 posts (in Estonian: <http://www.teadvus.wordpress.com>)

I have written 7 popular scientific articles to Horisont

I have talked about neuroscience in public broadcasting (7 times in radio, 4 times in national TV)

### **Participation in workshops and summer schools**

Brain Clocks and Rhythms Summer School

NeFF-Workshop on Non-linear and Model-free Interdependence Measures in Neuroscience 2012

ESI Workshop on Inter-areal interactions 2013

Workshop: Neural Correlates of Consciousness: Functional Neuroimaging of Sleep and Anesthesia 2014

Workshop: MIND23 2016

### **Other professional experience**

Since 2006 organizer of and lecturer at the "HTG Knowledge Day" in Tartu, Estonia

03.2008 Moderated the symposium "Simon effect and spatial cognition" at the TeaP 50 in Marburg, Germany

07.2010 Organized and moderated a symposium on cognitive neuroscience in Tallinn, Estonia

11.2012 Organized and moderated the science session for TEDxTartu 2012

05.2013 Organized the lecture by Prof. Wolf Singer in Tallinn, Estonia

06.2015 Co-organized The 3rd Baltic-Nordic Summer School on Neuroinformatics (BNNI 2015)

### **Publications**

#### Textbook

Aru, J., & Bachmann, T. (2009). *Tähelepanu ja teadvus*. Tallinn: Tänapäev. (in Estonian: "Attention and consciousness")

#### Popular scientific book

Aru, J. (2017). *Ajust ja arust*. Tallinn: Argo. (in Estonian: "Brain and thought")

#### Edited book

Aru, J., & Bachmann, T. (Eds.) (2015a). *Beyond the simple contrastive analysis: Appropriate experimental approaches for unraveling the neural basis of conscious experience*. Lausanne, Frontiers Media.

#### Book Chapter

Aru, J., Bachmann, T., Singer, W., & Melloni, L. (2015). On how the unconscious prerequisites and consequences of consciousness might derail us from unraveling the neural correlates of consciousness. In *The Constitution of Phenomenal Consciousness: Toward a Science and Theory, Advances in Consciousness Research, Vol. 92*, ed. Miller S. M.. Amsterdam: John Benjamins Publishing Company.

#### Peer-reviewed papers (24)

- Aru, J., & Bachmann, T. (2009a). Occipital EEG correlates of conscious awareness by invariant visual stimulation: speed-up of P1 and increase of gamma power. *Brain Research*, 1271, 60-73.
- Aru, J., & Bachmann, T. (2009b). Boosting up gamma-band oscillations leaves target-stimulus in masking out of awareness: explaining an apparent paradox. *Neuroscience Letters*, 450, 351-355.
- Murd, C., Aru, J., Hiio, M., Luiga, I., & Bachmann, T. (2010). Caffeine enhances frontal relative negativity of slow brain potentials in a task-free experimental setup. *Brain Research Bulletin*, 82, 39-45.
- Stamm, M., Aru, J., & Bachmann, T. (2011). Right-frontal slow negative potentials evoked by occipital TMS are reduced in NREM sleep. *Neuroscience Letters*, 493, 116-121.
- Aru, J., Axmacher, N., Do Lam, A.T.A., Fell, J., Elger, C.E., Singer, W., & Melloni, L. (2012a). Local category-specific gamma band responses in the visual cortex do not reflect conscious perception. *Journal of Neuroscience*, 32(43), 14909-14914.
- Aru, J., Bachmann, T., Singer, W., & Melloni, L. (2012b). Distilling the neural correlates of consciousness. *Neuroscience & Biobehavioral Reviews*, 36, 737-746.
- Aru, J., Korjus, K., Murd, C. & Bachmann, T. (2012c). Spectral signatures of the effects of caffeine and occipitally applied TMS in a task-free experimental setup. *Journal of Caffeine Research*, 2(1) 23-30.
- Roux, F., Wibral, M., Singer, W., Aru, J., & Uhlhaas, P. (2013). The phase of thalamic alpha activity modulates cortical gamma-band activity: Evidence from resting state MEG recordings. *Journal of Neuroscience*, 33(45):17827-17835.
- Aru, J., & Bachmann, T. (2013). Phenomenal awareness can emerge without attention. *Frontiers in Human Neuroscience*, 7:891.
- Aru, J., Aru, J., Priesemann, V., Wibral, M., Lana, L., Pipa, G., Singer, W. & Vicente, R. (2015). Untangling cross-frequency coupling in neuroscience. *Current Opinion in Neurobiology*, 31, 51-61.
- Korjus, K., Uusberg, A., Uibo, H., Kuldkepp, N., Kreegipuu, K., Allik, J., Vicente, R. & Aru, J. (2015). Personality cannot be predicted from the power of resting state EEG. *Frontiers in Neuroscience*, 9:63.
- Aru, J., & Bachmann, T. (2015b). Still wanted—the mechanisms of consciousness! *Frontiers in Psychology*, 6:5
- Bachmann, T., & Aru, J. (2015). Comments on how Mack et al.(2015)(do not) see iconic memory. *Consciousness and cognition*, 34, 73-74.
- Rutiku, R., Martin, M., Bachmann, T., & Aru, J. (2015). Does the P300 Reflect Conscious Perception Or Its Consequences? *Neuroscience*, 298, 180-189.
- Stamm, M., Aru, J., Rutiku, R., & Bachmann, T. (2015). Occipital long-interval paired pulse TMS leads to slow wave components in NREM sleep. *Consciousness and cognition*, 35, 78-87
- Rutiku, R., Aru, J., & Bachmann, T. (2016). General markers of conscious visual perception and their timing. *Frontiers in human neuroscience*, 10.
- Aru, J., Rutiku, R., Wibral, M., Singer, W., & Melloni, L. (2016). Early effects of previous experience on conscious perception. *Neuroscience of Consciousness*, niw004.
- Rutiku, R., Tulver, K., Aru, J., & Bachmann, T. (2016). Visual masking with frontally applied pre-stimulus TMS and its subject-specific neural correlates. *Brain research*, 1642, 136-145.
- Bachmann, T., & Aru, J. (2016). When expectation confounds iconic memory. *Consciousness and Cognition*, 45, 198-199.
- Aru, J., & Bachmann, T. (2017). In and out of consciousness: how does conscious processing (d) evolve over time? *Frontiers in Psychology*, 8, 128.
- Vasser, M., Kangsepp, M., Magomedkerimov, M., Kilvits, K., Stafinjak, V., Kivisik, T., Vicente, R. & Aru, J. (2017). VREX: An Open-Source Toolbox for Creating 3D Virtual Reality Experiments. *BMC Psychology*, 5, 4.

- Tampuu, A., Matiisen, T., Kodelja, D., Kuzovkin, I., Korjus, K., Aru, J., Aru, J. & Vicente, R. (accepted). Multiagent cooperation and competition with deep reinforcement learning. *Plos ONE*, *12*, e0172395.
- Laak, J., Vasser, M., Uibopuu, O.J., & Aru, J. (2017). Attention is withdrawn from the area of the visual field where the own hand is currently moving. *Neuroscience of Consciousness*, niw025.
- Aru, J., & Bachmann, T. (2017). Expectation creates something out of nothing: The role of attention in iconic memory reconsidered. *Consciousness and Cognition*, *53*, 203-210.