Ryota Kanai

Founder and CEO, Araya, Inc. / Project Manager, Japan's Moonshot R&D Program

Building a science of consciousness across brains, machines, and society.

Araya, Inc. | Tokyo, Japan | kanair@araya.org | https://kanair-gif.github.io/cv/ | https://scholar.google.com/citations?user=zaAL6YEAAAAJ&hl=en | https://orcid.org/0000-0002-0186-2687

200+ Academic papers	**74** H-index	**21,840** Citations	**159** i10-index

Biography

After graduating from the Faculty of Science at Kyoto University in 2000, Ryota Kanai received his PhD, Cum Laude, from Utrecht University in the Netherlands in 2005, where he studied mechanisms of human visual information processing.

He held research roles at the California Institute of Technology and University College London, served as a JST PRESTO researcher, and was Reader in Cognitive Neuroscience at the University of Sussex. In 2015, he founded Araya, Inc., where he works full-time.

His work combines neuroscience and AI to investigate principles of consciousness in brains and machines, while translating AI and neuroscience into industrial applications through Araya. Since 2020, he has served as Project Manager for the Moonshot R&D Program under Japan's Cabinet Office, developing next-generation AI-assisted brain-machine interfaces. In 2024, he served as Vice Chair and member of UNESCO's Ad Hoc Expert Group for drafting the Recommendation on the Ethics of Neurotechnology.

Current Positions

Founder and CEO - Araya, Inc., Tokyo, Japan - April 2015 - Present

Project Manager - Moonshot R&D Program, Cabinet Office of Japan - September 2020 - Present

Honorary Enterprise Professor - Melbourne School of Psychological Sciences, The University of Melbourne - July 2024 - Present

Editor-in-Chief - Journal of Artificial Intelligence and Consciousness - July 2025 - Present

Education and Training

JSPS Postdoctoral Fellow - Institute of Cognitive Neuroscience, University College London - 2010 - 2012 - Advisor: Prof. Geraint Rees. Project: neuroimaging research on the brain-structure basis of individual differences in visual perception.

Human Frontier Science Program Fellow - Institute of Cognitive Neuroscience, University College London - 2007 - 2010 - Advisor: Prof. Vincent Walsh. Project: transcranial brain stimulation research on visual and time perception.

Della Martin Fellow - Division of Biology, California Institute of Technology - 2005 - 2007 - Advisor: Prof. Shinsuke Shimojo. Project: psychophysics of visual and time perception.

PhD, Cum Laude - Helmholtz Institute, Utrecht University, The Netherlands - 2001 - 2005 - Advisor: Prof. Frans Verstraten. Project: psychophysics of visual and time perception.

BSc - Kyoto University, Faculty of Sciences, Japan - 1996 - 2000

Selected Publications

Identifying indicators of consciousness in AI systems
Butlin, P., Long, R., Bayne, T., Bengio, Y., Birch, J., Chalmers, D., Constant, A., Deane, G., Elmoznino, E., Fleming, S.M., Ji, X., Kanai, R., Klein, C., Lindsay, G., Michel, M., Mudrik, L., Peters, M.A.K., Schwitzgebel, E., Simon, J., VanRullen, R., Trends in Cognitive Sciences, 2025, DOI: 10.1016/j.tics.2025.10.011

Toward a universal theory of consciousness
Kanai, R., Fujisawa, I., Neuroscience of Consciousness, 2024, 2024, 1, DOI: 10.1093/nc/niae022

Deep learning and the Global Workspace Theory
VanRullen, R., Kanai, R., Trends in Neurosciences, 2021, 44, 9, 692-704, DOI: 10.1016/j.tins.2021.04.005

Information generation as a functional basis of consciousness
Kanai, R., Chang, A., Yu, Y., Magrans de Abril, I., Biehl, M., Guttenberg, N., Neuroscience of Consciousness, 2019, 2019, 1, niz016, DOI: 10.1093/nc/niz016

Time Adaptation Shows Duration Selectivity in the Human Parietal Cortex
Hayashi, M.J., Ditye, T., Harada, T., Hashiguchi, M., Sadato, N., Carlson, S., Walsh, V., Kanai, R., PLoS Biology, 2015, 13, 9, e1002262, DOI: 10.1371/journal.pbio.1002262

Cerebral hierarchies: predictive processing, precision and the pulvinar
Kanai, R., Komura, Y., Shipp, S., Friston, K., Philosophical Transactions of the Royal Society B, 2015, 370, 1668, 20140169, DOI: 10.1098/rstb.2014.0169

The structural basis of inter-individual differences in human behaviour and cognition
Kanai, R., Rees, G., Nature Reviews Neuroscience, 2011, 12, 231-242, DOI: 10.1038/nrn3000

Political orientations are correlated with brain structure in young adults
Kanai, R., Feilden, T., Firth, C., Rees, G., Current Biology, 2011, 21, 677-680, DOI: 10.1016/j.cub.2011.03.017

Human parietal cortex structure predicts individual differences in perceptual rivalry
Kanai, R., Bahrami, B., Rees, G., Current Biology, 2010, 20, 1626-1630, DOI: 10.1016/j.cub.2010.07.027

Frequency-Dependent Electrical Stimulation of the Visual Cortex
Kanai, R., Chaieb, L., Antal, A., Walsh, V., Paulus, W., Current Biology, 2008, 18, 1839-1843, DOI: 10.1016/j.cub.2008.10.027

The scope and limits of top-down attention in unconscious visual processing
Kanai, R., Tsuchiya, N., Verstraten, F.A.J., Current Biology, 2006, 16, 2332-2336, DOI: 10.1016/j.cub.2006.10.001

Steady-state misbinding of colour and motion
Wu, D.-A., Kanai, R., Shimojo, S., Nature, 2004, 429, 262, DOI: 10.1038/429262a

Recent Papers and Preprints

A Control-Theoretic Formulation of Global Workspace Theory
Ryota Kanai, arXiv, 2026, DOI: 10.48550/arXiv.2608.15926

Large-Scale Data Practicalizes EEG-Based Speech Decoding
Motoshige Sato, Kenichi Tomeoka, Ilya Horiguchi, Kai Arulkumaran, Ryota Kanai, Shuntaro Sasai, Brain-Computer Interface Research, 2026, 123-129, DOI: 10.1007/978-3-032-25828-1_13

The Stream of Computation: Temporal Continuity as a Missing Ingredient for Artificial Consciousness
Ryota Kanai, Yuwei Sun, Manuel Baltieri, Journal of Consciousness Studies, 2026, 33, 7-8, 35-60, DOI: 10.53765/20512201.33.7.035

Active inference for action-unaware agents
Filippo Torresan, Keisuke Suzuki, Ryota Kanai, Manuel Baltieri, Neurocomputing, 2026, DOI: 10.1016/j.neucom.2026.134399

Intrinsic Computational Functionalism and Simulated Consciousness
Ryota Kanai, Shuqin Ma, arXiv, 2026, DOI: 10.48550/arXiv.2606.15348

Intrinsic Computational Functionalism: From Observer-Relative Maps to Observer-Independent Structures
Shuqin Ma, Ryota Kanai, arXiv, 2026, DOI: 10.48550/arXiv.2606.06424

What are the Indecomposable Phenomenal Units of Qualia Structures?
Naotsugu Tsuchiya, Ryota Kanai, PsyArXiv, 2026, DOI: 10.31234/osf.io/nbxdk_v1

Canonical Functionalism: Defining Functional Structure without Observer-Relative Semantic Maps
Ryota Kanai, Shuqin Ma, arXiv, 2026, DOI: 10.48550/arXiv.2605.21506

Multi-modal Ensemble Approach for Decoding Player Intentions in Table Tennis
Trung Quang Pham, Shotaro Shiba Funai, Ryota Kanai, Junichi Chikazoe, bioRxiv, 2026, DOI: 10.64898/2026.05.04.721564

A Japan-origin motivational framework for diversive and specific curiosity: development of the English version of the Japanese Epistemic Curiosity scale
Kazuji Nishikawa, Ryota Kanai, Hiro Taiyo Hamada, Jamie Ward, Takashi Kusumi, Frontiers in Psychology, 2026, 17, DOI: 10.3389/fpsyg.2026.1762069

Prior preferences in active inference agents: soft, hard, and goal shaping
Filippo Torresan, Ryota Kanai, Manuel Baltieri, arXiv, 2025, DOI: 10.48550/arXiv.2512.03293

Meta-representations as representations of processes
Ryota Kanai, Ryota Takatsuki, Ippei Fujisawa, Neuroscience of Consciousness, 2025, 2025, 1, niaf038, DOI: 10.1093/nc/niaf038

Steam-engine naturalism
Manuel Baltieri, Ryota Kanai, PsyArXiv, 2025, DOI: 10.31234/osf.io/m4gk3_v1

Principal Bundle Geometry of Qualia: Understanding the Quality of Consciousness from Symmetry
Masafumi Oizumi, Chanseok Lim, Ryota Kanai, PsyArXiv, 2025, DOI: 10.31234/osf.io/agupq_v4

Grants and Fellowships

Moonshot Research & Development Programme - Cabinet Office of Japan - 2020 - Present - "Liberation from Biological Limitations via Physical, Cognitive, and Perceptual Augmentation." Project Manager: Ryota Kanai. Approximately 15B JPY / 95M USD, December 2020 - November 2030.

Linking machine intelligence to consciousness - Templeton World Charity Foundation - 2018 - 2021 - PI: Ryota Kanai. USD 222,750, July 25, 2018 - July 24, 2021.

CREST - Japan Science and Technology Agency - 2015 - 2020 - PI: Ryota Kanai. 280,000,000 JPY, approximately 2.5M USD, October 2015 - March 2021.

ImPACT Programme - Cabinet Office of Japan - 2015 - 2016 - The Impulsing Paradigm Change through disruptive Technologies programme. PI: Ryota Kanai. 34,000,000 JPY, approximately 300K USD, April 2015 - March 2016.

JST PRESTO - Japan Science and Technology Agency - 2011 - 2015 - Precursory Research for Embryonic Science and Technology. PI: Ryota Kanai. 40,000,000 JPY, approximately 350K USD, October 2011 - March 2014.

Royal Society International Short Visits Scheme - Royal Society - 2008 - Collaboration with Prof. Walter Paulus at University of Goettingen to develop transcranial alternating current stimulation. GBP 3,920.

JSPS Fellowship - 2010 - 2012 - GBP 72,600, approximately 114,000 USD.

Human Frontier Science Program Long-Term Fellowship - 2007 - 2010 - GBP 84,500, approximately 133,000 USD.

Della Martin Fellowship - California Institute of Technology - 2005 - 2007 - USD 80,000.

Honors

World Omosiroi Award - 2021

JEITA Venture Award - Japan - 2020

KDDI Mugen Lab Award, 1st Prize - Tokyo, Japan - 2019

Microsoft Innovation Award, 1st Prize - 2018 - Awarded for "Algorithm for Neural Network requiring less computation resources" as Araya, Inc.

EY Innovative Startup - 2018 - Awarded as Araya, Inc.

Tech Planter Bioscience Grand Prix, Nihon Unisys Award - Tokyo, Japan - 2015

The Young Scientists' Prize - The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology of Japan

Best PhD Dissertation Award - Netherlands Psychonomics Society NVP - 2007 - Best PhD dissertation during the period 2005-2007.

Top Ten Finalist, Best Visual Illusion of the Year - 2005

Huygens Scholarship - 2000 - 2001

Service

Vice Chair and member, UNESCO Ad Hoc Expert Group - 2024 - 2025 - Drafting the Recommendation on the Ethics of Neurotechnology.

Chair, ASSC 27 - Association for the Scientific Study of Consciousness, Tokyo, Japan - 2024

Founder - Consciousness Club Tokyo - October 2015 - Present

Founder - Beneficial AI Japan - April 2018

Vice Executive Chair - Symposium on AI and Society, Tokyo, Japan - October 2017

Scientific Organizing Committee - ISSA Summer School, Osaka, Japan - May-June 2017

Scientific Program Committee - ASSC 24, Tel Aviv, Israel - 2020

Scientific Program Committee - ASSC 23, Ontario, Canada - 2019

Scientific Program Committee - ASSC 21, Beijing, China - 2017

Chief Organizer - Symposium on The Origin of Consciousness, Tokyo, Japan - July 2016

Editorial Board - Entropy - 2021 - Present

Editorial Board - Neuroscience of Consciousness - 2015 - Present

Associate Editor - Frontiers in Consciousness Research - 2015 - Present

Review Editor - Frontiers in Perception Science - 2010 - Present

Grant referee - Ad hoc referee for Medical Research Council, ERC Consolidator grant, NWO Veni grant, DFG Priority Programme, Vienna Science and Technology Fund, COST / State Secretariat for Education and Research, and JSPS Gakujutsu Henkaku A.

Journal referee - Ad hoc referee for journals including Neuron, Nature Computational Science, Nature Methods, Science Advances, Brain, Current Biology, PNAS, PLoS Biology, Journal of Neuroscience, Trends in Cognitive Sciences, Molecular Psychiatry, Biological Psychiatry, NeuroImage, Human Brain Mapping, Journal of Vision, Cortex, and Journal of Consciousness Studies.

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