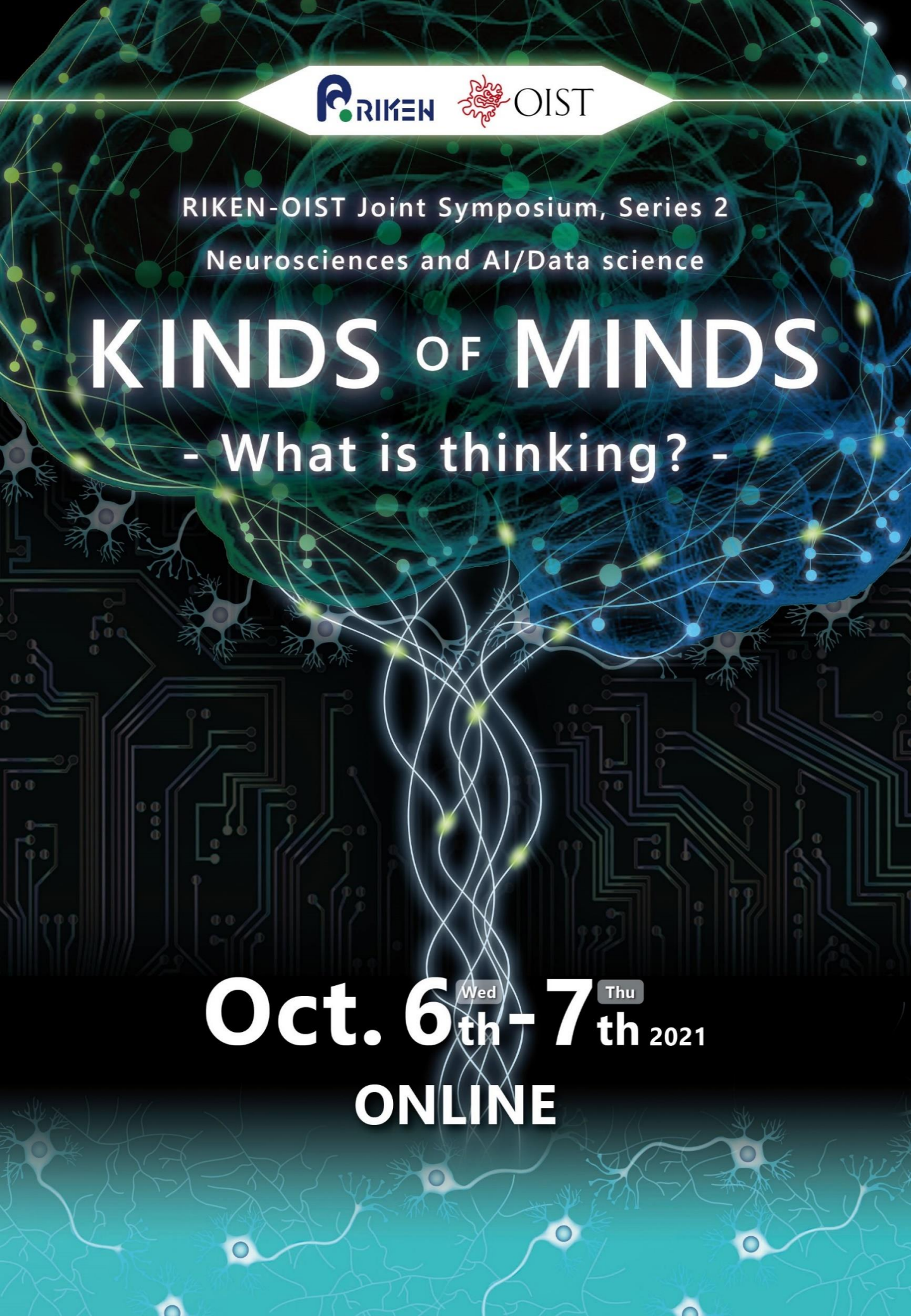

RIKEN
OIST
RIKEN-OIST Joint Symposium, Series 2
Neurosciences and AI/Data science
KINDS OF MINDS
- What is thinking? -
Oct. 6th Wed - 7th Thu 2021
ONLINE

Content

Notice:

On participation, all participants must consent to confidentiality. Please confirm clause of the following confidentiality notice again.

1. I will respect the fact that some of the information and research discussed during this Joint Symposium may not yet be in the public domain.
2. Therefore, I will not disseminate or make further distribution of information obtained by me during the symposium without the express permission of the presenter and his or her institute.
3. In addition, I will not give/take any photographs, video or screenshots or record the contents of any presentation or discussion that takes place in the course of the symposium.

Preface

RIKEN

Hidetoshi Kotera

Executive Director

On behalf of RIKEN, I express my sincere gratitude to the president of OIST, Provost, Dean of research, staff members and Organized committee of this symposium.
It is our grate honor to be host of this second symposium, entitled “neuroscience and AI /Data science”.
As seen in the contribution of science and technology to COVID-19 pandemic, joint research beyond research areas, open data, and open science are also very important. Under the comprehensive agreement between OIST and RIKEN, RIKEN will make its best effort to nurture our collaboration with OIST across the full spectrum of science, research, education, and facilities sharing.
The first symposium was held in Okinawa in April, hosted by OIST, with the aim of promoting collaboration, which is the purpose of this comprehensive agreement.
This time, due to the COVID-19, symposium is held by using of web system, but we are expecting the intensive discussion will be held between attendance over research area. RIKEN has a long history of brain science research. And AI and data driven science researcher center had started recently. I hope not only researcher in the field of brain science, AI and data science, but also researchers in physics, chemistry, engineering, agriculture, medicine, and life science join this symposium. And I think this is a good opportunity to create new joint research across disciplines between OIST and RIKEN.

Thank you again for OIST and all staffs to organize such a significant event.
I am hoping to see you in the symposium.

Preface

OIST

Mary Collins

Provost

First, on behalf of OIST, I express my sincere gratitude to the president of RIKEN, the executive director of the RIKEN Cluster for Science, Technology and Innovation Hub, and staff members of RIKEN for hosting this symposium.
We all understand that it takes tremendous effort to host an event in the uncertain situation of this pandemic.

Second, I am very excited about the topic for this symposium, centered at the interface between neuroscience and AI and focused on questions related to the mind. Following April's symposium on ecological issues, this symposium will provide new avenues for interdisciplinary collaboration. I hope this symposium will spur new ideas, leading to breakthroughs in biology and artificial intelligence.

Finally, I wish to acknowledge that it is OIST's privilege to partner with RIKEN, one of the most prestigious research institutes in Japan and the world.
This relationship is an important milestone in this, OIST's tenth anniversary year.
Partnership with RIKEN is an essential element for the development of OIST, whose mission is to promote world-class interdisciplinary research, pursue new knowledge through research, and produce internationally outstanding research results in science and technology for the benefit of Okinawa and, more broadly, for Japan.

OIST will make its best effort to nurture our collaboration with RIKEN across the full spectrum of science, research, education, and facilities sharing.

Thank you again for hosting such a significant event.
I am hoping to see you in person, sometime in the near future.

Message

Message form the Program Committee

The last decade has seen strings of breakthroughs in both neuroscience and artificial intelligence research. While there have long been fruitful exchanges between these fields, there is increased recent interest in the borderlands, using computational ideas and techniques to inform biology, and vice versa. This symposium brings together researchers working on a diversity of topics circling around questions related to the mind. We hope to catalyze new ideas, future collaborations, and an appreciation for the diversity of views on the topic. Please join us.

Committee Members

Kazuhiro SAKURADA,
Project Leader,
RIKEN Information R&D and Strategy Headquarters

Tomomi SHIMOGORI,
Team Leader,
RIKEN Center for Brain Science

Tomoki FUKAI,
Professor,
OIST

Sam REITER,
Assistant Professor,
OIST

Schedule

October 6th, Wed

<Main Session>

9:00 - 9:10	Opening Remarks RIKEN Exec Dir, Dr. Hidetoshi KOTERA	
9:10 - 10:30	Session I-1. "Open systems approaches in neuroscience -- I" chaired by Dr. Kazuhiro SAKURADA, Group Director, R-IH	
(9:15-9:40)	Dr. Andrea BENUCCI, Team Leader, RIKEN CBS	Stability of visual perception as a classification invariance in convolutional neuronal networks.
(9:40-10:05)	Dr. Tom FROESE, Assist. Professor, OIST	Exploring embodied social cognition with AI and neuroscience.
(10:05-10:30)	Dr. Kazuhisa SHIBATA, Team Leader, RIKEN CBS	Reading and manipulating information in the brain.
10:30–10:45	--- Coffee Break ---	
10:45-12:00	Session I-2. "Open systems approaches in neuroscience -- II" chaired by Dr. Kazuhiro SAKURADA, Group Director, R-IH	
(10:45-11:10)	Dr. Jun TANI , Professor, OIST	Studies on cognitive neurorobotics using the framework of predictive coding and active inference.
(11:10-11:35)	Dr. Reiko MAZUKA, Team Leader, RIKEN CBS	What we can learn from how human infants learn language in real time?
(11:35-12:00)	Kenji DOYA, Professor, OIST	The duality of inference and control as a key to understanding canonical cortical circuits
12:00-12:50	--- Lunch Time ---	

Continued to the next page

Schedule

October 6th, Wed

Continued from the previous page

12:00-12:50	--- Lunch Time ---	
12:50-14:35	Session II "Advances in neuroscience“ chaired by Dr. Sam Reiter, Assist. Professor, OIST	
(12:55-13:20)	Dr. Bernd KUHN Optical Neuroimaging Unit, OIST	Ca+ activity maps of astrocytes tagged by axo-astrocytic AAV transfer
(13:20-13:45)	Dr. Jun NAGAI, Team Leader, RIKEN CBS	Behind the scenes in neural circuits: Astrocyte regulation of behavior in health and disease
(13:45-14:10)	Dr. Yoko YAZAKI-SUGIYAMA, Assoc. Professor, OIST	Neural Circuit for Social Authentication in Zebra Finch Song Learning.
(14:10-14:35)	Dr. Asuka TAKEISHI, RIKEN Hakubi Team Leader, RIKEN CBS/CPR	Neural mechanism of behavior modulation in C. elegans.
14:35-14:50	--- Coffee Break ---	
14:50-16:35	Session III "AI/data science and brain/mind“ chaired by Dr. Yoko YAZAKI-SUGIYAMA, OIST	
(14:55-15:20)	Dr. Tomomi SHIMOGORI, Team Leader, RIKEN CBS	Cellular-resolution gene expression profiling in the neonatal marmoset brain reveals dynamic species- and region-specific differences.
(15:20-15:45)	Dr. Sam REITER, Assist. Professor, OIST	Exploring 2-stage sleep in octopus.
(15:45-16:10)	Dr. Henrik SKIBBE, Unit Leader, RIKEN CBS	Brain image analysis.
(16:10-16:35)	Dr. Tomoki FUKAI, Professor, OIST	What can neural network models tell about brain activity: two separate strata in the cortex?
16:35-17:15	Virtual Lab Tour of RIKEN Nishina Center	
17:15-17:25	Closing Remarks OIST Provost, Dr. Mary COLLINS	
17:25-19:00	Networking - Twenty breakout rooms will be available	

Schedule

October 7th, Thu

<Poster Session & Mini Workshop>

9:00-10:30	Poster Sessions
10:30-11:45	Mini Workshops
(rough schedule)	Six posters are assigned to each of the following themes as shown in the list of p.16-17. Discussion Leaders for each theme will moderate discussions.
Theme & Discussion Leaders	Theme 1 "Advances in neuroscience" moderated by Asuka TAKEISHI, RIKEN Hakubi Team Leader, RIKEN CBS and Yoko YAZAKI-SUGIYAMA, Assoc. Professor, OIST
	Theme 2 "AI/data science and brain/mind" moderated by Tomomi SHIMOGORI, Team Leader, RIKEN CBS and Sam REITER, Assist. Professor, OIST
	Theme 3 "Open systems approaches in neuroscience" moderated by Andrea BENUCCI, Team Leader, RIKEN CBS and Tom FROESE, Assist. Professor, OIST
11:45-12:00	Wrap Up Discussion Leaders for each themes will summarize the discussion, and then Director of RCSTI of RIKEN and Dean of Research of OIST will make comprehensive comments.
12:00-14:00	Networking - Twenty breakout rooms will be available.

Instruction

Information:

- **Virtual Lab Tour of RIKEN Nishina Center for Accelerator-Based Science (RNC)** will be held on the first day.
- RIKEN Research Centers will be introduced using **Videos** during Lunch time and Coffee Break. **Refer to P19 for details.**
- As this symposium is held with only online style, communication between participants might be difficult. For **additional Q&A and information exchange**, breakout rooms for networking will be prepared in the same ZOOM meeting room as the symposium. They will be **available at 17:30-19:00 on Day1 and at 12:00-14:00 on Day2.** If you want to contact with any participants, join the networking.

Instruction:

- Main Session will be conducted using Zoom meeting room.
- Poster Sessions and Mini Workshops will be conducted using breakout room function of Zoom.
- The Zoom Link will be noticed by e-mail on the Oct 4. **The same Link** can be used on DAY1 and DAY2.
- On the Oct 4, after you enter the meeting room, select the room focused your favorite theme.
- If you want to ask a question or to make a comment, **click "Raise Hand"**  from the Reaction  at the bottom of window even during the presentation.
- If you want to move to another breakout room in the Poster Session and the Mini Workshop, you can enter by selecting the room from the "Breakout Room" icon  .

Lab for Neural Circuits and Behavior, RIKEN Center for Brain Science

Team Leader, Andrea Benucci

Stability of visual perception as a classification invariance in convolutional neuronal networks

Our ability to perceive a stable visual world in the presence of continuous movements has puzzled researchers in the neuroscience field for a long time. We reformulated this problem in the context of hierarchical convolutional neural networks (CNN)—observed in the mammalian visual system—and show that perceptual stability can emerge from an optimization process that identifies image-defining features for accurate image classification in the presence of movements. Movement signals, multiplexed with visual inputs along overlapping convolutional layers, enabled movement-related classification invariance that, as a secondary process, permitted coordinate transformations from retinocentric to craniocentric reference frames. Classification invariance was reflected in clustered activity patterns in low dimensional manifolds associated with image categories and emerging in late CNN layers. Furthermore, movement signals affected visual responses according to modulatory principles observed experimentally during saccadic eye movements. Our findings provide a computational framework that unifies a multitude of biological observations on perceptual stability under optimality principles for image classification in artificial neural networks.

Embodied Cognitive Science Unit, OIST

Assistant Professor, Tom Froese

Exploring embodied social cognition with AI and neuroscience

The social brain hypothesis has long been a dominant framework for understanding the relative increase of brain size in human evolution. However, recent large-scale analyses of brain-body data question its validity and generality as a principle of brain evolution. At the same time, theoretical advances in embodied social cognition have started to cast doubt on that framework's adoption of methodological individualism as a starting point for thinking about brain function. In this talk, I will present agent-based models that permit us to systematically evaluate what real-time social interaction does to the complexity of neural activity, which holds a few surprises in store. And I will present preliminary data from our EEG hyperscanning lab, which confirms that social interaction indeed deeply affects brain functions.

Lab for Human Cognition and Learning, RIKEN Center for Brain Science

Team Leader, Kazuhisa Shibata

Reading and manipulating information in the brain

This talk will summarize technological developments in the field of human cognitive neuroscience over the past 20 years. First, I will describe multivariate analyses of brain signals measured by noninvasive neuroimaging methods such as functional magnetic resonance imaging (fMRI) and electroencephalography. These multivariate analyses have allowed researchers to read out or decode specific information from patterns of the brain signals. Second, I will explain real-time neurofeedback methods in which brain signals are presented to participants in a real-time manner to induce neural plasticity that in turn leads to changes in behavior. Third, I will introduce decoded neurofeedback, a hybrid technology that combined multivariate analyses with real-time fMRI neurofeedback. It has been shown that decoded neurofeedback induces specific fMRI signal patterns in a local and targeted brain region and changes specific behavior without participants' awareness of the purpose of the experiment. Collectively, recent technological development in human cognitive neuroscience have enabled reading and manipulating information in the brain and substantially advanced both basic and clinical research.

Cognitive Neurorobotics Research Unit, OIST

Professor, Jun Tani

Studies on cognitive neurorobotics using the framework of predictive coding and active inference

The focus of my research has been to investigate how cognitive agents can develop structural representation and functions via iterative interaction with the world, exercising agency and learning from resultant perceptual experience. For this purpose, my team has investigated various models analogous to predictive coding and active inference frameworks. For the last two decades, we have applied these frameworks to develop cognitive constructs for robots. The current talk introduces a set of emergent phenomena which we found in the robotics experiments. These findings inform us of possible non-trivial cognitive mechanisms in the brains.

Lab for Language Development, RIKEN Center for Brain Science,
Department of Psychology & Neuroscience, Duke University

Team Leader, Reiko Mazuka

What we can learn from how human infants learn language in real time? Nature of input.

In language learning research, it is crucial to understand the precise nature of input. This is particularly significant in real-life language acquisition, since it is known that how adults talk to infants (Infant-directed-speech, IDS) differs substantially from adult-to-adult speech. Yet, compared to "the mechanism" side of learning -- the structure and the procedures of learning, the nature of input from which learning must occur has not received the equal level of scrutiny.
In this talk, we will demonstrate the importance of accurate characterization of input by showing two examples in phonological learning, in which failing to take into account relevant factors led to inaccurate conclusions – duration based consonant distinction acquisition, and the speech rate in IDS. These examples highlights the importance of examining not only the target features but also other factors that are potentially relevant in the input.

Neural Computation Unit, OIST

Professor, Kenji Doya

The duality of inference and control as a key to understanding canonical cortical circuits

An intriguing question about the brain is why the entire neocortex shares a canonical six-layer architecture while its posterior and anterior halves are engaged in sensory processing and motor control, respectively.
Here we consider the hypothesis that the sensory and motor cortical circuits implement the dual computations for Bayesian inference and optimal control, respectively. Based on the architecture of the canonical cortical circuit, we explore how different cortical neurons may represent variables and implement computations for inference and control.

Optical Neuroimaging Unit, OIST

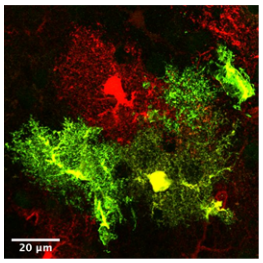
Professor, Bernd Kuhn

Ca+ activity maps of astrocytes tagged by axo-astrocytic AAV transfer

Astrocytes exhibit localized Ca2+ microdomain (MD) activity thought to be actively involved in information processing in the brain. However, the functional organization of Ca2+ MDs in space and time in relationship to behavior and neuronal activity is poorly understood. We used a novel toolkit to investigate Ca2+ MD activity in single astrocytes in behaving mice. We discovered that Adeno-Associated Viruses (AAVs) transfer anterogradely from axons to astrocytes. Axo-astrocytic AAV transfer combined with genetically encoded calcium indicators, in vivo two photon microscopy and unbiased, event-based analysis enabled high-contrast investigation of cortical astrocytes embedded in the vibrissal thalamocortical circuit. The frequency, duration and size of Ca2+ MD signals were extensively altered by locomotion but only subtly with sensory stimulation. The overlay of these signals resulted in behavior-dependent maps with characteristic Ca2+ activity hotspots. These functional subdomains are stable over days, suggesting subcellular specialization.

Lab for Glia-Neuron Circuit Dynamics, RIKEN Center for Brain Science

Team Leader, Jun Nagai



Behind the scenes in neural circuits: Astrocyte regulation of behavior in health and disease

Astrocytes, a type of non-neuronal glial cells, tile the entire central nervous system. I will report the latest insights on astrocyte signaling in the adult neural circuits, by using multiple integrated approaches, including calcium imaging, electrophysiology, opto/pharmaco-genetics, mouse behavioral tests, RNA-seq and new astrocyte manipulation tools that we recently developed. First, I will describe mechanisms of bi-directional neuron-astrocyte communications in the striatum that lead to hyperactivity and disrupted attention via a synaptogenic cue. Second, I will present how astrocytes respond to distinct perturbations and how we can use the molecular signaling information for phenotypic benefits in neurodegenerative disease mouse models, e.g. Huntington's disease. Taken together, our findings show that signaling from astrocytes to neurons is sufficient per se to alter synapses, circuits and behavior. We also provide new tools to study such astrocyte-neuron dynamics.

Neuronal Mechanism for Critical Period Unit, OIST

Associate Professor, Yoko Yazaki-Sugiyama

Neural Circuit for Social Authentication in Zebra Finch Song Learning

Social interactions are essential when learning to communicate. In human speech and bird song, infants must acquire accurate vocalization patterns and learn to associate them with live tutors and not mimetic sources. However, the neural mechanism of social reality during vocal learning remains unknown. Here, we characterize a neural circuit for social authentication in support of accurate song learning in the zebra finch. We recorded neural activity in the noradrenergic command center, the locus coeruleus (LC), of juvenile birds during song learning from a live adult tutor. LC activity increased with real, not artificial, social information during learning that enhanced the precision and robustness of the learned song. During live social song learning, LC firing reconfigured long-term song-selective neural responsiveness in an auditory memory region, the caudomedial nidopallium (NCM). In accord, optogenetic inhibition of LC presynaptic signaling in the NCM disordered NCM neuronal responsiveness to live tutor singing and impaired song learning. These results demonstrate that the LC-NCM neural circuit integrates sensory evidence of real social interactions, distinct from song prosody, to authenticate song learning. The findings suggest a general mechanism for validating social information in brain development.

Lab for Neural Circuit of Multisensory Integration RIKEN Hakubi Research Team, RIKEN Center for Brain Science / Cluster for Pioneering Research

Team Leader, Asuka Takeishi

Neural mechanism of behavior modulation in C. elegans

Animals make behavior decisions by integrating information of environmental stimuli and internal state. *C. elegans*, worms, has contributed greatly to elucidate the neural and molecular mechanisms of behavior decision with its advantages of the transparent body for fluorescent imaging, simple nervous system with complete connectome, and various genetic tools. Temperature is one of the most important environmental cues for animal survival, and worms thus can detect and respond to the subtle environmental temperature change. We have been studying how worms integrate sensory cues to modulate their temperature dependent behavior (thermotaxis) in order to understand the molecular and the neural basis of behavior decision. Here, I would like to present our recent findings on the mechanisms of starvation-dependent alteration of thermotaxis. Also, I would like to introduce our ongoing research to dissect the integration mechanisms of temperature and odor information, together with the newly developed techniques that we would like to incorporate in our future studies.

Lab for Molecular Mechanisms of Brain Development, RIKEN Center for Brain Science

Team Leader, Tomomi Shimogori

Cellular-resolution gene expression profiling in the neonatal marmoset brain reveals dynamic species- and region-specific differences

Precise spatiotemporal control of gene expression in the developing brain is critical for neural circuit formation, and comprehensive expression mapping in the developing primate brain is crucial to understand brain function in health and disease. Here, we developed an unbiased, automated, large-scale, cellular-resolution in situ hybridization (ISH)-based gene expression profiling system (GePS) and companion analysis to reveal gene expression patterns in the neonatal New World marmoset cortex, thalamus, and striatum that are distinct from those in mice. Gene-ontology analysis of marmoset-specific genes revealed associations with catalytic activity in the visual cortex and neuropsychiatric disorders in the thalamus. Cortically expressed genes with clear area boundaries were used in a three-dimensional cortical surface mapping algorithm to delineate higher-order cortical areas not evident in two-dimensional ISH data. GePS provides a powerful platform to elucidate the molecular mechanisms underlying primate neurobiology and developmental psychiatric and neurological disorders.

Computational Neuroethology Unit, OIST

Assistant Professor, Sam Reiter

Exploring 2-stage sleep in octopus

Human sleep can be divided into two stages, rapid eye movement (REM) and slow wave (SW) sleep, each with distinct behavioral and neural correlates as well as proposed functions. Two-stage sleep has been shown to be present in other mammals, as well as birds, reptiles, and fish. This suggests that it evolved very early in vertebrate evolution, has been maintained over the hundreds of millions of years separating these diverse animal groups, and therefore is of fundamental importance functionally. We recently found that octopuses, which evolved large brains and complex behaviors independently of the vertebrate lineage, also possess two stages of sleep ('active' and 'inactive'). Each stage has a range of behavioral correlates resembling vertebrate REM and SW sleep. Octopus active sleep is characterized by the rapid transitioning through a series of brain-controlled skin patterns. Through high-resolution filming and computational analysis, we are attempting to relate octopus waking and sleeping skin patterns, and thus decode the evolving contents of octopus sleep. The possibility that two similar stages of sleep evolved convergently suggests a comparative approach may reveal general principles of sleep function.

Brain Image Analysis Unit, RIKEN Center for Brain Science

Unit Leader, Henrik Skibbe

Brain Image Analysis

The goal of our unit is to develop algorithms and tools for the processing and analysis of multi-modal biomedical imaging data. Since we are a member of the Brain/MINDS project, much of our data are images of the brains of marmoset monkeys. First, I will introduce our ongoing work on processing neural tracer and gene expression images.
One challenge in working with biomedical image data is that we must deal with uncertainty. As examples, I will present two methods we have developed in our unit: (1) A probabilistic axon tracking algorithm for large microscopy images. (2) A probabilistic convolutional neural network for predicting the evolution of white matter hyperintensities from MR images of the (human) brain.

Neural Coding and Brain Computing Unit, OIST

Professor, Tomoki Fukai

What can neural network models tell about brain activity: two separate strata in the cortex?

Cell assembly refers to a group of neurons that are repeatedly coactivated to serve as a functional unit of cortical computation. The existence of such assemblies has often been indicated by the precise spatiotemporal firing patterns of a group of neurons as well as the clustered wiring patterns of cortical neurons. While machine learning offers various tools for detecting cell assemblies, here we show a different approach: we use a brain-inspired network model for segmenting cell- assembly structures in large-scale neural recording data. As a successful example, we report the assemblies of highly sparse firing (<1 Hz) neurons that are repeatedly activated across the superficial and deep layers of the rat motor cortex in a behavior-relevant manner. This study was also motivated by recent observations suggesting that local cortical circuits in the superficial layers and deep layers are, as a default, independent strata of brain computing. If so, the question is "who connects these strata, when and why?" Although our results cannot directly answer this question, they give an insight into the dynamics of cortical microcircuits in relation to this question.

Poster Session & Mini Workshop

On the second day, we will hold Poster Sessions to be followed by Mini Workshops.

Poster Presenters will introduce their research topics and key points using their posters and will discuss with the help of moderators. Based on the keywords entered at the registration, the posters will be categorized into one of the three themes, corresponding to those of the first day's Oral Sessions. Approximately six posters will be assigned to each theme. For each theme, a breakout room will be setup and a moderator will host the session. Symposium participants will each select the room focused their favorite theme and will be able to join the discussion. Poster Sessions will last for approximately 90 minutes, followed by corresponding Mini Workshops.

In the Mini Workshops, Discussion Leaders will do a deep dive on selected topics from among those featured in the posters presented, and will moderate and lead discussions about possible collaborations and ways forward.

Discussion Leaders for and Posters assigned to each theme are shown below. Authors and Titles of Posters are listed on pages 16-17.

Theme 1	Advances in neuroscience
Discussion Leaders	Asuka Takeishi, Hakubi Team Leader, RIKEN CBS Yoko Yazaki-Sugiyama, Assoc. Professor, OIST
Posters	#3, T. M. Rutkowski; #5, L. Okamoto; #6, M. Sukegawa; #11, S. Funai; #15, Z. Taoufiq; #17, S. V. Flores
Theme 2	AI/data science and brain/mind
Discussion Leaders	Tomomi Shimogori, Team Leader, RIKEN CBS Izumi Fukunaga, Assist. Professor, OIST
Posters	#1, M. F. Rachmadi, #4, N. Lei; #7, E. Rinaldi; #8, L. Gu; #10, R. Koshkin; #14, T. Asabuki
Theme 3	Open systems approaches in neuroscience
Discussion Leaders	Andrea Benucci, Team Leader, RIKEN CBS Tom Froese, Assist. Professor, OIST
Posters	#2, C. Poon; #9, H. Takeichi; #12, C. L. Loh; #13, S. R. Vizcaya; #16, I Shpurov; #18, L Mojica

Poster Session

No.	Author (Name/Affiliation)	Title
1	Muhammad Febrian Rachmadi Brain Image Analysis Unit, CBS, RIKEN	Probabilistic Deep Learning with Adversarial Training and Volume Interval Estimation - Better Ways to Perform and Evaluate Predictive Models for White Matter Hyperintensities Evolution.
2	Charissa Poon Brain Image Analysis Unit, CBS, RIKEN	Deep learning applications for automated microscopy image analyses in the neurosciences.
3	Tomasz Maciej Rutkowski Cognitive Behavioral Assistive Technology Team, AIP, RIKEN	AI Neurotechnology Application to Early Dementia Onset Elucidation from EEG in Visual Emotional and Reminiscent Interior Sorting Tasks.
4	Ni Lei Plant Genome Evolution Research Team, RNC, RIKEN	Massive genome sequencing analysis of accelerated carbon-ion-induced mutations in Saccharomyces cerevisiae.
5	Lisa Okamoto Lab for Integrated Cellular Systems, IMS, RIKEN	Meta-analysis of transcriptional regulatory networks for lipid metabolism in the neural cells from schizophrenia patients.
6	Momoe Sukegawa Lab for Neuroepitranscriptomics, BDR, RIKEN	Investigating the behavioral impact of environmental factors on BALB/c strain mice.
7	Enrico Rinaldi iTHEMS, RIKEN	Simulation-based inference for multi-type cortical circuits.
8	Lin Gu Machine Intelligence for Medical Engineering Team, AIP, RIKEN	Enhance AI with Artificial Memory Inspired by Neuroscience.
9	Hiroshige Takeichi Open Systems Information Science Team, Information R&D and Strategy Headquarters, RIKEN	Complex constraints in visual perception.
10	Roman Koshkin Neural Coding and Brain Computing Unit, OIST	Leveraging Self-organized Structure for Memory Encoding in Binary Networks.

Continued to next page

Poster Session

Continued from previous page

No.	Author (Name/Affiliation)	Title
11	Shotaro Funai Physics and Biology Unit, OIST	Comparison of neural activity for appreciation of Japanese tanka in human brain and artificial intelligence.
12	Chen Lam Loh Embodied Cognitive Science Unit, OIST	A Minimal Model for Interbrain Synchrony.
13	Susana Ramírez Vizcaya Embodied Cognitive Science Unit, OIST	Agents of Habit: Refining the Artificial Life Route to Artificial Intelligence.
14	Toshitake Asabuki Neural Coding and Brain Computing Unit, OIST	Learning spontaneously reactivatable prior distributions for causal inference.
15	Zacharie Taoufiq Cellular and Molecular Synaptic Function Unit, OIST	Molecular anatomy of brain synapses from living psychiatric patients.
16	Ivan Shpurov, Embodied Cognitive Science Unit, OIST	Combining Self-critical dynamics and Hebbian learning to explain utility of bursty dynamics in neural networks.
17	Sergio Verduzco Flores Neural Computation Unit, OIST	Spinal cord plasticity "solves" the sensorimotor loop.
18	Laura Mojica Embodied Cognitive Science Unit, OIST	One body, four types of mind.

Acknowledgments

Science and Technology Hub Promotion Division of RIKEN (STHPD) would like to express our deep gratitude to All contributors for their cooperation in planning and managing the Joint Symposium.

STHPD express special gratitude to the Program Committee Members, Drs. Kazuhiro Sakurada, Tomomi SHIMOGORI, Tomoki FUKAI and Sam REITER, for making concept of scientific discussion and selecting the best speakers.

STHPD also thanks Ms. Kaori SERAKAKI in Media Relations Section of the OIST to design a poster, a cover of this booklet and a banner of the website symbolizing the theme of the symposium.

Appendix

○ Distribution schedule of the video introducing RIKEN Research Centers.
Click the title of video to jump the website of Youtube.

DAY1

Before Opening	- 1. Introduction to RIKEN 2021 (All RIKEN) - 2. 脳科学と(Brain Science and) RIKEN CBS introduction video (RIKEN CBS) *
Coffee Break #1	- 2. 脳科学と(Brain Science and) RIKEN CBS introduction video (RIKEN CBS) * - 3. RIKEN CBS Faculty & Labs: Laboratory for Neural Computation and Adaptation (RIKEN CBS)
Lunch Time	- 1. Introduction to RIKEN 2021 (All RIKEN) - 4. RIKEN AIP: Creating Innovative Fundamental AI Technology for Society (RIKEN AIP) - 5. Take a tour of the supercomputer Fugaku (R-CCS) - 6. Work at RIKEN! An Invitation for Young Researchers (All RIKEN) - 7. RRH: Ion beams 'supersize' larval fish diet (RNC)
Coffee Break #2	- 8. RIKEN CBS Faculty & Labs: RIKEN Hakubi Research Team: Neural circuit of multisensory integration (RIKEN CBS/CPR) - 4. RIKEN AIP: Creating Innovative Fundamental AI Technology for Society (RIKEN AIP) - 5. Take a tour of the supercomputer Fugaku (R-CCS)

**Sorry, only in Japanese. Please use English subtitle that is automatically added by Youtube.*

DAY2

Before Poster Session	- 1. Introduction to RIKEN 2021 (All RIKEN) - 4. RIKEN AIP: Creating Innovative Fundamental AI Technology for Society (RIKEN AIP)

See also here.
- riken english channel
https://www.youtube.com/c/rikenenglishchannel
- rikenchannel (Japanese site)
https://www.youtube.com/user/rikenchannel