



# Perspectives on Consciousness

An intimate workshop


May 15-16, 2019  
Tur Sinai Organic Farm  
Jerusalem



האוניברסיטה העברית בירושלים  
THE HEBREW UNIVERSITY OF JERUSALEM

אוניברסיטת חיפה  
University of Haifa





**This workshop** is a new attempt to address the question of consciousness from a variety of perspectives, thereby allowing broader vistas into the study of this intriguing phenomenon. The gathering brings together neuroscientists, philosophers, neuro-phenomenologists, historians, psychologists and scholars of Eastern contemplative traditions, with the hope that the different approaches will enrich each other and encourage a deeper understanding of consciousness. While we each stand to learn from each other and thus advance our own research, we also expect that new insights will be obtained from the very intersection of perspectives.

The workshop aims to make room for diverse approaches to consciousness, with special interest in the relation between analyses that approach it from within and ones that address it from without. As part of this interest, we also assume that encountering ourselves as conscious agents may allow us to pursue our inquiry with greater sensitivity and precision. Thus, we integrate short reflective pauses and contemplative moments of meditation into the schedule of the workshop, including one longer session that will be guided by a Tibetan Buddhist monk. We also intend to devote attention to the question of whether meditation can offer privileged access to basic or multiple forms of consciousness, thereby paving new pathways for scientific investigation.

Our effort is to make real advances in our ability to generate a meaningful discussion of consciousness – What it consciousness about? What is significant about it? How does it relate to the brain? How does it relate to the Self (if there is such an entity, however it may be defined)? Are there different states of consciousness and how may these be analyzed through scientific investigation? What questions should science ask about consciousness, and which tools can it use in order to deepen and expand its analysis? Does consciousness ultimately deserve the intense consideration it seems to call for? Our conviction is that in order to move forward with these questions, and in order to generate new insights, we all need each other – the philosopher needs the scholar of Buddhism who needs the brain scientist who needs the expert in meditation, and vice versa.

This workshop is planned as an opening to a larger project, which aims to develop integrative and novel approaches to consciousness. We strive to reach a more formidable scientific ground that will allow us to responsibly address this crucial issue, which stands at the heart of the human quest for knowledge.

### **Organizing Committee:**

Aviva Berkovich-Ohana, University of Haifa

Idan Segev, The Hebrew University of Jerusalem

Eviatar Shulman, The Hebrew University of Jerusalem

Noa Segev, Technion



## Wednesday, 15th May

9:30-9:45	<b>Opening remarks</b> Idan Segev, Noa Segev, Aviva Berkovich-Ohana, Eviatar Shulman
9:45-11:30	<b>Overview</b> <b>David McMahan</b> – <i>Situating consciousness and reflexivity in context</i> <b>Liad Mudrik</b> – <i>Current theories of consciousness: an attempt to arbitrate between prominent accounts</i> <b>Eviatar Shulman</b> – <i>Indian reflections on reduction to consciousness</i> <b>Moderating</b> – Aviva Berkovich-Ohana
11:30-11:50	Coffee break
11:50-14:00	<b>Neurophenomenology</b> Meditation <b>Presenting</b> – <b>Yochai Ataria</b> – <i>Consciousness from Husserl to Varela</i> <b>Aviva Berkovich-Ohana</b> – <i>Using Neurophenomenology to study self-consciousness</i> <b>Yair Dor-Ziderman</b> – <i>Harnessing the potential of the well-trained mind for Neurophenomenological exploration</i> <b>Mathis Trautwein</b> – <i>Exploring neural processes of boundary dissolution in meditation</i> <b>Ohad Nave</b> – <i>The phenomenology of boundary dissolution in meditation</i> <b>Commenting</b> – Leon Deouell <b>Moderating</b> – Idan Segev
14:00-15:15	Lunch (vegetarian)
15:15-17:00	<b>Neuroscience</b> Meditation <b>Presenting</b> – <b>Itzhak Fried</b> – <i>The preconscious self and its neurons</i> <b>Rafael Malach</b> – <i>Igniting conscious perceptual content in the human brain</i> <b>Commenting</b> – Arnon Levy <b>Moderating</b> – Roy Salomon
17:00-17:20	Coffee break



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17:20-18:45 **Predictions: East and West**

Meditation

**Paññānando Bhikkhu** – *Consciousness Investigating and developing itself*

**Moshe Bar** – *Emptiness and the proactive brain*

**Moderating** – Aviva Berkovich-Ohana

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18:45-19:30 **A meditative artistic experience**

**Ora Balha** – *The dance of the whirling dervish: An active meditation of the heart.* Sufi dance show and workshop.

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19:30-21:30 Dinner (Derech Hagefen, Beit Zait)

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## Thursday, 16th May

9:30-10:55	<b>Consciousness in Buddhism &amp; Meditation</b> <b>Geshe Dorji Damdrul</b> – <i>Consciousness from a Nalanda Buddhist psychology point of view</i>
10:55-11:15	Coffee break
11:15-13:15	<b>Self-consciousness</b> <b>Presenting</b> – <b>David Rudrauf</b> – <i>The Projective consciousness model: Integrating perception, imagination, emotion and action in a global cybernetic framework</i> <b>Roy Salomon</b> – <i>Being an I: Cognitive and neurobiological processes of "self" models</i> <b>Aviva Berkovich-Ohana</b> – <i>The consciousness state-space: A neurophenomenological model for consciousness and selfhood</i> <b>Commenting</b> – Naftali Tishby <b>Moderating</b> – Oded Maimon
13:15-14:30	Lunch
14:30-16:15	<b>Contemplative traditions and altered states</b> Meditation <b>Presenting</b> – <b>George Dreyfus</b> – <i>What happens when the Self goes? An inquiry into the experience of no-self and its pathologies</i> <b>Ulrich Ott</b> – <i>Meditation: from self-regulation to ego-dissolution</i> <b>Commenting</b> – Orly Shenker <b>Moderating</b> – Eviatar Shulman
16:00-16:20	Coffee break
16:20-18:20	<b>Agency and free will</b> Meditation <b>Presenting</b> – <b>Stefan Schmidt</b> – <i>Neurophenomenology of voluntary action: The Libet experiment with an experienced meditator</i> <b>Srinivasan Narayanan</b> – <i>Event control, intentions and agency</i> <b>Ariel Furstenberg</b> – <i>Covert intentions and agency</i> <b>Commenting</b> – Liad Mudrik <b>Moderating</b> – Yochai Ataria
18:30-18:40	A short break





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18:30-20:00

**Discussion & Concluding remarks**

Idan Segev, Noa Segev, Eviatar Shulman, Aviva Berkovich-Ohana

*Concluding reflections, sharing, and future plans*

*Take home meditation*

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20:00

Light dinner (vegetarian) and after-party

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## Perspectives on Consciousness

### An alphabetic list of participants



#### Yochai Ataria

Yochai Ataria is a senior lecturer at Tel-Hai College, Israel. He conducted his post-doctoral research in the Neurobiology Department at the Weizmann Institute of Science. He is the author of the following books: *The Structural Trauma of Western Culture* (2017); *Body Disownership in Complex Post-Traumatic Stress Disorder* (2018); *The Mathematics of Trauma* [Hebrew] (2014); *Not in our Brain* [Hebrew] (2019). In addition, he co-edited the following volumes: *Interdisciplinary Handbook of Culture and Trauma* (2016); *Jean Améry: Beyond the Minds Limits* (2019); *Kafka: New Perspectives* [Hebrew] (2013); *The End of the Human Era* [Hebrew] (2016); *2001: A Space Odyssey – 50th Anniversary* [Hebrew] (2019).

**The hard problem in the study of consciousness:** Since my BA studies, the *hard problem* is *always on my mind* (to quote the King). In the last couple of years, however, I became quite pessimistic about it: I am not even sure that we are going in the right direction. Yet that being said, I am not certain that as it stands this problem, namely *the hard problem in the study of consciousness*, is well defined. In that sense, I am not sure whether it is a problem that needs to be solved or rather ignored.

**The computational approach in neuroscience:** As I see matters, I am not at all sure that the hard/software notion is applicable. Indeed, I find it quite difficult to discern even one good reason to think that computing is all we do. Clearly, computing is something we have the ability to do in very limited situations, yet the human being is much more than just computing.

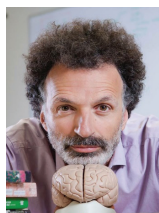
**Extended mind:** It goes with saying that our brain is important, yet I am not sure that consciousness can be reduced to brain activity alone. We are not in our brain.

**Phenomenology:** I believe that phenomenology is the right way to go. By this I mean taking the subjective experience as seriously as possible. Essentially Husserl, the so called "father" of this field, believed in an ongoing dialogue between phenomenological psychology on the one hand and psychophysical psychology on the other. In my opinion, at least, this ongoing dialogue is the most important thing.

**Neurophenomenology:** At the beginning of the twentieth century, Husserl offered an in-depth understanding of the limits of psychophysical psychology in its broadest sense. In addition, he argued that understanding the subjective experience requires us not only to adopt the phenomenological approach but also to create a fertile dialogue between psychophysical psychology and phenomenological psychology. In his neurophenomenology research program (NRP), Varela took this one step further. The NRP was designed to present a model that can account for both the phenomenology and neurobiology of consciousness



in an integrated and coherent way. In practice this means bridging, and not merely showing correlations, between first-person subjective accounts and brain activity. With regard to consciousness studies, I find that, pragmatically at least, Varela's approach works for me.



## Moshe Bar

Professor Bar is The Director of the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University and the head of the Cognitive Neuroscience Lab. He is an internationally recognized cognitive neuroscientist, whose novel research has made revolutionary contributions to our understanding of perception, cognition and issues in psychiatry.

Before moving to Israel to head the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University, Professor Bar was an Associate Professor in Neuroscience, Psychiatry and Radiology at Harvard Medical School and the Massachusetts General Hospital.

Prof. Bar and his team discovered that the human brain is engaged in thinking about the future surprisingly frequently, and in doing so it relies heavily on memory. He examines how mental simulations (such as planning and mind-wandering) influence foresight and facilitate our daily interaction with the environment. Along with exploring how the brain extracts and uses contextual information to generate predictions and guide cognition efficiently, his work focuses on questions spanning the flow of information in the cortex during visual recognition and conscious perception, contextual associative processing of scene information, the cortical mechanisms mediating the formation of first impressions, and the visual elements that determine human preference. Prof. Bar uses neuroimaging (fMRI, MEG, EEG), psychophysical and computational methods in his research.



## Aviva Berkovich-Ohana

I'm a senior lecturer, affiliated at the University of Haifa, Edmond J. Safra Brain Research Center, and Departments of Counseling and Human Development, as well as Learning, Instruction and Teacher Education. My training included a PhD in Neurobiology (Gonda Multidisciplinary Brain Research Center, Bar-Ilan University, Israel), and post-doctorate at the Weizmann Institute, Israel, as well as Sapienza University, Rome, Italy.

Major research interests include the effects of contemplative mental training on consciousness, cognition and self. Specifically, I study the effects of contemplative training on sense of self and neural self-related processing. To these ends, I utilize a broad spectrum of tools, including EEG, MEG, fMRI, and various behavioral and cognitive tasks.

Another major research interest is neuro-phenomenology, utilizing depth phenomenology to guide the neural analysis, in collaboration with proficient contemplative practitioners. Such an approach enables studying highly subtle human experiences, typically overlooked



in cognitive science.

Finally, I'm very interested in theoretical conceptualization of consciousness, and have developed a model, named the Consciousness State Space (CSS). The CSS presents a neuro-phenomenological model for consciousness and selfhood which relates time, awareness, and emotion within one framework, thus creates a comprehensive theoretical framework with explanatory and unificatory power.



## Paññānando Bhikkhu

Born in 1955 in Tel-Aviv, ordained as a Buddhist monk (Bhikkhu) in 2011 in the Forest Tradition of North-Eastern Thailand. Since the end of 2013 lives in Israel as a practicing monk, counselling and teaching lay people. and translating sutras of the Pali canon into Hebrew.

My general view of consciousness:

- I would re-define consciousness as: The living-being's mode of operation.
- This mode of operation includes the process that is about things and thus produces meaning.
- This process is faulty, resulting in a faulty view of things as they are. Acting according to this faulty view leads to suffering.
- The Buddha-Dharma aims at finding and implementing a general solution to all suffering. The way to do so includes critically reviewing one's own continuous meaning-producing process, and gradually changing it.
- It is the Buddha's claim that this goal has been reached by him and by some of his followers, thus proving to them the validity of the way taught by him.



## Leon Deouell

I am a cognitive neuroscientist based at the department of psychology and the Edmond and Lily Safra Center for brain sciences at the Hebrew University, and a medical doctor in my past.

My interest in consciousness (and in fact, in neuroscience) started from observing patients with unilateral neglect following stroke, who are unaware of half of the world, even without any sensory deficit. This is a paradigmatic situation of the contrast between awareness and unawareness, within the same individual. Since there is quite a bit of evidence that much of the information on the neglected side is processed, I became curious about the cognitive (computational) and neural (implementational) prerequisites of being consciously aware. I have suggested long ago, based on EEG studies in patients, that obtaining a spatial tag is one of the prerequisites for being aware of external events, but I believe it is only one of multiple prerequisites which I am trying to delineate. I am skeptical about most of the current suggestions for the neural correlates of consciousness (including oscillations, recurrence, IIT, global workspace) which try to reduce "consciousness"

to a single process, mechanism, or principle, and trying to find a different way to approach the question. In my daily job I use EEG, ECOG, fMRI, eye tracking and behavior to explore perceptual processes inside and outside the focus of attention, and in some cases with and without awareness.



### **Geshe Dorji Damdrul**

Ven. Geshe Dorji Damdul is the Director, Tibet House, Cultural Centre of His Holiness the Dalai Lama, New Delhi. He has undertaken several projects for His Holiness the Dalai Lama, serving as the primary translator for many of his works. Geshe Dorji Damdul earned his Geshe Lharampa Degree in 2002 from Drepung Loseling Monastic University. He travels widely within India and abroad to teach Buddhist Philosophy, Psychology, Logic and Practice.



### **Yair Dor-Ziderman**

Dr. Yair Dor-Ziderman received MSc and PhD degrees from the Gonda Multidisciplinary Brain Research Center at Bar-Ilan University in Israel. There he studied top-down neuroscientific mechanisms of minimal self-awareness using magnetoencephalography measures of brain activity, behavioral performance and phenomenology in meditation, hypnotically-induced OBEs and under existential threat. For the past 15 years, he has been practicing in traditional and contemporary Buddhist traditions and views scientific and contemplative inquiry as complementary paths to growth and wisdom. Currently, he is a research fellow at the Sagol Center for Brain and Mind at the Interdisciplinary Center Herzliya, Israel, where his research focuses on cognitive, physiological and phenomenological dimensions of compassion.

My empirical work has focused on top-down methods for studying minimal aspects of self-awareness. Minimal self-awareness is the consciousness of oneself as the immediate subject of experience; its core features are the pre-reflective sense of being a knowing and enduring agent inhabiting a body situated within, but separate from, a world of things and other beings. These were investigated using a diverse array of behavioral and MEG paradigms, including neurophenomenology for studying self-boundary dissolution experiences in long-term meditators (with Dr. Aviva Berkovich-Ohana); hypnotically-induced out-of-body experiences for studying the neural correlates of self location; and coupling mortality salience with self or other -awareness for studying the neurocognitive mechanisms underlying the sense of being an enduring entity.

Meditation has matured in Western society to a point where long-term meditators are no longer scarce. Little is known about advanced meditative states; on their underlying neurocognitive architecture and even more fundamentally, on their phenomenology. I propose a new type of research paradigm which focuses on the controlled generation and

mapping of the felt experience and neurophysiology of such mind-brain states. Such a lab would employ individuals with highly trained minds who would practice specifically-tailored mind-training regimes to inhabit precise subjective states corresponding to current research objectives. Such information would have the potential to widen and deepen our knowledge of human conscious experience, and map out previously unexplored territory of the mental landscape.



## George Dreyfus

Georges Dreyfus (Ph.D., University of Virginia) spent fifteen years in Buddhist monasteries before receiving in 1985 the title of Geshe, the highest degree conferred by Tibetan monastic universities. He then entered the University of Virginia where he received his M.A. and Ph.D. in the History of Religions program. He is currently Professor of Religion of the Department of Religion at Williams College. He has published 5 books, including/ *Recognizing Reality: Dharmakirti and his Tibetan Interpreters* /(Albany: SUNY Press, 1997), / *The Svatantrika-Prasangika Distinction*/(Co-edited with Sara McClintock, Boston: Wisdom, 2003), and/*The Sound of Two Hands Clapping: the Education of a Tibetan Buddhist Monk*/(Berkeley: University of California Press, 2003), and many articles on various aspects of Buddhist philosophy and Tibetan culture. He has been chair of the Religion department at Williams College and chair of the Tibetan and Himalayan Religions group of the American Academy of Religion. He is the recipient of various awards such as a National Endowment for the Humanities.

My interest in consciousness has been to formulate a Buddhist view that is both rooted in the tradition and able to address the modern scientific researches on this topic. In my view, such a view cannot be

based just on the scientific studies of meditation but should also include the resources provided by traditional Indian Buddhist philosophy, particularly the view of the Yogacara school, which provides the basis of a Buddhist phenomenology. It is this perspective that I discuss the self, a topic where Buddhist philosophy can make a real contribution.



## Itzhak Fried

Obtained MD from Stanford University, PhD from UCLA and neurosurgical training at Yale. Professor of Neurosurgery and Director of Epilepsy Surgery, Department of Neurosurgery, UCLA School of Medicine; Director of Functional neurosurgery at Tel-Aviv Medical Center and Professor of Neurosurgery at the Sackler Faculty of Medicine, Tel-Aviv University, Israel.



### Research topics relevant to consciousness:

**Free will:** Replicated Libet's findings in 2011 at the scale of the single neuron. These studies suggest consciousness comes in a later stage of decision making than previously expected – challenging any versions of "free will" where intention occurs at the beginning of the human decision process.

**Perception and Memory:** Recording from electrodes implanted in the brains of human epileptic patients, discovered neurons in the medial temporal lobe responding selectively to consciously perceived, imagined or recalled stimuli; discovered a class of "concept cells" with invariance culminating in hippocampus and entorhinal cortex and found preconscious signature of single neuronal activity prior to free recall and conscious transitions during paradigms such as binocular rivalry. Identified neurons in hippocampus that were activated both while viewing specific episodes, and prior to recollecting the same episodes that activated them during viewing. Exploring the extension of neural codes identified during spatial navigation, such as the codes for place cells and grid cells, to the neural codes serving human conceptual knowledge.

**Neuromodulation:** Studied effects of electrical stimulation in eliciting conscious experiences of volition, perception and recollections. Used electrical stimulation to study enhancement of encoding and consolidation of experience during waking and sleep states.



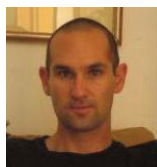
### Ariel Furstenberg

Ariel Furstenberg is a research associate at the Racah Institute of Physics & Edmond and Lily Safra Center for Brain Sciences (ELSC) at the Hebrew University of Jerusalem. His current interest lies on the borderline between philosophy and brain science, specifically regarding the issue of agency, intentionality, self-control and free-will; conducting human behavioral and electrophysiological experimentation. He did his Masters and Ph.D. at the Cohn Institute for the History and Philosophy of Science at Tel Aviv University on issues of concept formation and conceptual change, and a Post-doc at the Institute for Advanced Study in Princeton.

**How conscious are our rapid changes of mind?** In order for decisions to play a significant role in human and animal behavior they have to be dynamic and contain the possibility for changes of choice, in order to enable continuous adjustment to the changing world. The situation becomes more perplexing when changes of choice occur in situations where one has to select between arbitrary alternatives that make no difference to the agent, that are equally desirable, or when the potential rewards are unknown ('picking'). However, I will show results revealing the temporal dynamics of rapid intention formation and, moreover, changes of choice in a *free choice picking* scenario, in which the alternatives are on a par for the participant. The results suggest that even in arbitrary choices, endogenous or exogenous biases that are present in the neural system for selecting one or another option may be *implicitly* and *non-consciously* overruled. Moreover, measures of *conflict* and *error*



were found to be associated with such free-choice temporal dynamics of change of choice. I would like to focus on the issue of implicit and non-conscious changes of mind, which can nevertheless be traced via imaging and other techniques. In what way do such rapid implicit changes of mind help retain one's self-control and free-will behavior.



### Arnon Levi

I am primarily a philosopher of science, with a special interest in biology. I am interested in whether and how a science of consciousness would look, with special attention to the evolution of conscious experience – its origin, function, relation to cognition in general and related questions.



### Oded Maimon

Oded is the Oracle chair professor in Tel Aviv University. Before that he was at MIT. He has written ten leading award winning research books on the algorithms of artificial intelligence, and edited two books on consciousness – the last one – 'what is consciousness', appeared in 2018.

Currently he is developing a mathematical model of consciousness, and the evolution of human beings (as part of Digital Living 2030 research project, a joint grant with Stanford University). In 2018-19 he taught a graduate course in this name in the University.

Oded recently published a paper: "Axioms of Soft Logic", which lay the foundation of new mathematics for consciousness. The new theory is based on five axioms that are the foundation of the model. From the axioms definitions and theorems are evolved (including in algebra – proving field properties, calculus and dynamical systems). The mathematics is also expressed geometrically. For example one of the geometrical results is the Mobius strip, which has the property of locally presenting two opposing views that merge into the same one (thus containing this paradox as a legitimate logic – which we term soft logic).

Oded studies in consciousness include many sources, such as Indian (during his sabbatical in BHU in Varanasi), and encounters in South America. Oded has let the wind take him over the ocean from Boston to Israel (as a skipper of a small sailboat), where consciousness is slowly revealed.



### Rafael Malach

I have received my PhD in Physiological Optics (1982) from the University of California at Berkeley. And then spent several years as a postdoctoral fellow studying neuroanatomy at the Massachusetts Institute of Technology (MIT). Since 1985, I have joined the staff of the department of Neurobiology at the Weizmann Institute where I hold a professorial chair in Brain Research.



My central research aim is to uncover principles by which the human brain underlies the emergence of high level cognitive processes- mainly conscious perceptual awareness and free behaviors. To that end I combine functional brain imaging using magnetic resonance with invasive electrophysiological recordings, performed for diagnostic purposes in patients. My group has contributed to mapping of human brain areas involved in visual recognition and perceptual awareness, their principle of organization and the delineation of the hierarchy of visual processing. We have provided evidence arguing for a switch from ultra-slow fluctuations to rapid "ignition"-like bursts as a critical factor in the emergence of conscious content in the brain. More recently our work extended to the examination of spontaneous brain activity patterns and their potential role in understanding self-generated behaviors such as free recall. Finally, we explore similarities between artificial deep convolutional networks and neuronal groups as a potential new approach to understanding neuronal function.



### Ofra Mayseless

I am a professor of developmental psychology at the Faculty of Education, University of Haifa, Israel and also a certified clinical psychologist. I served as Dean of the Faculty of Education University of Haifa and as Head of the National Pedagogical Secretariat, Ministry of Education Israel, published over 100 articles and chapters, edited two books and authored one.

My research focused on close relationships and children's, adolescents' and adults' attachment and caregiving representations and manifestations. I also investigated the transition to adulthood in the Israeli context using in depth longitudinal studies highlighting unique developmental processes in the Israeli culture. I was especially interested in the caregiving/nurturing motivational system and in caring processes in parenting, leadership, mentoring and role reversal, and recently published a book 'The Caring Motivation: An Integrated Theory' in Oxford University Press which combines my insights as well as others in suggesting a comprehensive theory of our innate, fundamental, encompassing and biologically- and evolutionary-based motivation to care.

Pertinent to the study of consciousness, for the past 10 years I have focused on spiritual processes and spiritual development and has been active in inviting the study of spirituality to the Academia by (a) initiating research on spiritual processes (e.g., channeling, processes of spiritual change, and spiritual transformative experiences in nature), (b) organizing conferences (e.g., the annual Conference for the Study of Contemporary Spiritualities now at its 10th year, the first Israeli conference on Contemplative Education, the first Israeli conference on Gateways to Spirituality in Psychotherapy and Counselling). I also help open the first MA studies specializing in Integrative Psychotherapy Mind-Body-Spirit, and established a year ago together with others the Multi-University Center for the Study of Human Spirit (in progress).

I am interested in states of consciousness (which I view as spiritual in their nature) that open up new ways of knowing or involve unique experiences which are often associated with deep insights and are life changers. These include for example, openness to inner or higher intuition, openness to sense others even at the distance, immersion into something greater than oneself that instigates a different perspective of life, awe, intuitive creative processes and elevation. I am interested in how the brain works in such states and the extent to which such states can be voluntarily invoked, and whether we can assess if the knowledge or insights gained have some validity beyond their phenomenological veracity.



## David L. McMahan

David L. McMahan is the Charles A. Dana Professor of Religious Studies at Franklin & Marshall College in Pennsylvania. He is the author of *The Making of Buddhist Modernism* (Oxford University Press, 2008), *Empty Vision: Metaphor and Visionary Imagery in Mahāyāna Buddhism* (Routledge Curzon, 2002), and several articles on Mahāyāna Buddhism in South Asia and Buddhism in the modern world. He is also the co-editor of *Buddhism, Meditation and Science* (Oxford University Press, 2017), editor of *Buddhism in the Modern World* (Routledge 2012). He has written on Indian Buddhist literature, visual metaphors and practice, and the early history of the Mahāyāna movement in India. More recently, his work has focused on the interface of Buddhism and modernity, including its interactions with science, psychology, modernist literature, romanticism, and transcendentalism. He is currently researching the various ways that Buddhist and Buddhist-derived meditation is understood and practiced in different cultural and historical contexts, ancient and modern.

The contemporary study of consciousness is the latest chapter in a long history of the investigation of the nature of the mind along with reflexive “technologies of the self” that attempt to understand and transform the mind. As Michel Foucault and Pierre Hadot have demonstrated, such investigations and technologies were prominent among the ancient Greeks. Ancient Indian philosophy also developed complex views of consciousness and meditative practices for understanding and transforming it. These concerns were taken up in the modern period by both Enlightenment rationalism and Romanticism. The contemporary moment, with advanced neuroscientific technology and sophisticated experimental protocols, offers unprecedented possibilities for continuing this study. Yet, like its predecessors, it contains certain implicit views of the human being and consciousness, along with epistemological suppositions that both allow for certain investigative possibilities and curtail others. The contemporary scientific study of meditation illustrates some of the possibilities and limitations of normative modes of studying consciousness today. These modes carry echoes of a representational model of mind from Cartesian dualism, along with a more recent model of the human being that Ortega and Vidal have called the “cerebral self”— a powerful contemporary picture of the human being as essentially identical with



the brain and its functions. I'll point out some of the limitations of these pictures and gesture toward more embodied, contextual understandings of consciousness and meditation as suggestions for going forward.



## Liad Mudrik

Dr. Liad Mudrik started her academic career as student of the interdisciplinary program for outstanding students. She completed two Ph.D. dissertations at Tel Aviv University: her Ph.D. in cognitive neuroscience (psychology department) focused on the role of consciousness and attention in processing contextual violations. Her Ph.D. in philosophy was a descriptive-deconstructive analysis of the mind-body problem in neuroscience. She then continued to a postdoctoral fellowship at the California Institute of Technology, in Christof Koch's lab. In 2015, she began her appointment as a faculty member in Tel Aviv University's school of psychological science and the Sagol school of neuroscience. Her lab studies the neural bases of high-level cognition, focusing on conscious experience and cognitive effects on perception.

My research focuses on conscious experience – asking first if it plays a functional role in thinking and behavior, second – how it is affected by our knowledge and expectations, and third – how it comes about, or what are the neural mechanisms underlying it. In my lab, we have been pursuing the above questions, using mostly EEG and psychophysics, with a very strong emphasis on finding new ways to scientifically study consciousness in a more ecological manner. Our key research questions are: (a) What are the functions of consciousness? Our attempt to address this question has mainly been focused on two potential functions of consciousness: integration of information and volitional control. (b) How is our conscious perception affected by our expectations and semantic knowledge? Do they come into play only at later stages, of reinterpretation and scene comprehension, or do they also affect earlier perceptual stages, including those which precede object identification? (c) What are the neural substrates of consciousness? In a recent collaboration, we provided human single-unit evidence for frontal involvement in the process, and we are now engaged in an attempt to arbitrate among the major theories in the field. (d) How to study consciousness in a more ecological manner? We developed a new variant of Continuous Flash Suppression using augmented reality, which allows, for the first time, to suppress real-life objects and not only on-screen images. This opens new and exciting possibilities to study unconscious perception and the relations between vision for perception and vision for action. In parallel, we developed a new virtual reality protocol which mimics natural walking in the street and uses inattention blindness to probe unconscious processing of salient stimuli in this immersive environment.





## Ohad Nave

2nd year MA student in Cognitive Sciences in the Hebrew University of Jerusalem. Studying the phenomenology of sense of boundary dissolution in meditation practitioners as part of a neuro-phenomenological research. Trained in micro-phenomenology interview technique which facilitates access to subjective experience and allows its detailed description for the purpose of analysis and integration in a scientifically rigorous framework.

Participating in a neurophenomenological study which examines the experience of dissolution of one's sense of boundaries during meditation. It is done under the supervision of Dr. Aviva Berkovich-Ohana, Dr. Yochai Ataria & Dr. Eviatar Shulman. We have worked with 39 experienced meditation practitioners trained in a specific meditation technique. This training is aimed to promote their control over the way their self-consciousness, and specifically their sense of boundaries, through enhancing and dissolving it volitionally. While meditating, their brain activity was measured by MEG. This measuring was then followed by personal interview conducted by me which will allow a characterization in detail of the specific phenomenology of each participant. The phenomenological data will then be used to group participants and classify them in a way that will enrich and constrain the neural data analysis. This effort is unique in its integration of 1stpersonal methodologies that is designed towards a description of conscious lived experience within a neuroscientific framework, thus promoting the novel paradigm of Neurophenomenology.



## Yuval Noah Harari

Yuval Noah Harari, a professor in the Department of History at the Hebrew University of Jerusalem, is the bestselling author of "Sapiens: A Brief History of Humankind," "Homo Deus: A Brief History of Tomorrow," and "21 Lessons for the 21st Century." His current research focuses on macro-historical questions such as: What is the relationship between history and biology? What is the essential difference between Homo sapiens and other animals? Is there justice in history? Does history have a direction? Did people become happier as history unfolded? What ethical questions do science and technology raise in the 21st century?

As for my interest in consciousness - "I believe the question of consciousness has always been the most important question facing humans. It is the key to understanding life. The fact that science does not understand consciousness is the greatest lacuna in the scientific worldview. And in the 21st century, this lacuna is becoming extremely dangerous. For we are now acquiring the ability to re-engineer life. If we indeed learn how to re-engineer life before we understand consciousness, we might misuse our power in truly terrible ways."





## Ulrich Ott

I am psychologist and yoga teacher heading the work group "Altered States of Consciousness – Meditation Research" at the Bender Institute of Neuroimaging, Justus Liebig University Giessen, Germany. We use interviews, questionnaires, and physiological measures (electroencephalography, magnetic resonance imaging) to study effects of meditation on brain and consciousness.

In my doctoral thesis, I studied EEG correlates of deep meditation states. By interviewing advanced practitioners of different meditation traditions I investigated phenomenological characteristics of deep meditation states like emptiness, ego-dissolution, mystical union, and bliss. From 1998 to 2005 I participated in an international research consortium on altered states of consciousness, where my fields of interest were trance induction by rhythmic sensory stimulation, meditation, and near-death experiences. Since 2005 my studies are focused on effects of meditation practice on brain function and structure. In current projects I investigate (1) possible adverse effects of meditation, (2) the use of yogic breathing techniques for self-regulation, and (3) the combination of EEG biofeedback and meditation to influence specific networks in the brain (for facilitating meditation training in beginners and therapeutic application in mental disorders where the self-regulation of these networks is impaired).



## David Rudrauf

Professor of Psychology, at the University of Geneva, FAPSE, Department of Psychology, a member of the Swiss Center for Affective Sciences, Campus Biotech, and of the Centre Universitaire d'Informatique at the University of Geneva. Director of the Laboratory of Multimodal Modelling of Emotion & Feeling. After years of research in neuroscience, neuropsychology, electrophysiology and multimodal neuroimaging in the US and in

France, his current research has moved to mathematical psychology, and the development of a computational model of embodied consciousness, combined with Virtual Reality and robotics, in order to study the normal and pathological mechanisms of the mind, with a focus on imagination, social perspective taking and emotion regulation, and their relations to behavior and the brain.

**The Projective Consciousness Model: Integrating perception, imagination, emotion and action in a global cybernetic framework.** The Projective Consciousness Model (PCM) (Rudrauf et al, 2017; Williford et al, 2018) is an attempt to unify psychology computationally, with the broadest possible explanatory power about a multiplicity of phenomena and behaviours, from perception, imagination, appraisal, emotion, social cognition, motivation, and action. The PCM advances previous formulations of active inference by featuring an

explicit psychological and cybernetic model of the form, structure and dynamics of conscious experience, formulated as a formal Field of Consciousness, integrating 3D projective geometry and the Free Energy principle (Friston, 2010). The model integrates counterfactual or multi-perspectival first-person perspectives with affective dynamics, for the global optimization of action outcomes. The PCM offers an explicit, formal, computable and integrative basis for testing hypotheses about normal and pathological psychological mechanisms quantitatively. The principles of the model will be explained, and will be illustrated with applications to: perception, focusing on visual illusions; artificial agent simulations of resilient navigation in the context of affective stressors based on imaginary projections in the future; social perspective taking in the context of modeling joint attention and Autism Spectrum Disorders, using both artificial agent simulations and initial implementations in collective robots; the modeling of emotion dynamics and the generation of complex facial expressions as a function of affective states. We will discuss perspectives around the model for strong AI and autonomous robotics, as a basis for designing interpretable social artificial agents and more generally as a method for psychological science.



## Roy Salomon

Dr. Roy Salomon is an Assistant Professor at the Gonda Brain Research Center at Bar Ilan University. Dr. Salomon completed his PhD. at Tel Aviv University and the Weizmann Institute and continued to a post-doctoral fellowship at EPFL with Prof. Olaf Blanke. His work centers on the construct of the "Self" and its relation to sensorimotor processing in the brain in healthy and clinical populations. He uses behavioral, computational and neuroimaging techniques to study self-models in the human brain.

**Being an I: Cognitive and Neurobiological processes of "self" models.** Perhaps the most fundamental construct of the human psyche is the sense of self. "Self" models are present at several distinct levels of cognition and underlie essential phenomenological aspects of the human experience, from the feeling of being an embodied agent in this world to our personal autobiographical narrative. Despite the dominant role of the "Self" in our psychology, the cognitive and neural mechanisms underlying this construct are not well understood. In this talk I will show how the brain integrates interoceptive, sensory and motor signals to form the fundamental model of the bodily self, allowing us the experience of being an embodied agent in this world. I will further examine how the bodily self can be compromised in neurological and psychiatric conditions highlighting the role of deviant predictive processing in modulating the models of the Self. Finally, I will discuss possible mechanisms and consequences of volitional modifications of the sense of "self".





## Stefan Schmidt

I have a degree in psychology and a PhD in psychophysiology. I am mainly a researcher in mindfulness and meditation but I have also expertise in clinical psychology, complementary and alternative medicine, placebo research, anomalies research and psychotherapy research. I have a full professorship on Systemic Therapy at the Clinic for Psychosomatic Medicine at the University Medical Center Freiburg. I am head of a research group on systemic health perspectives. Our group has a neurophysiology lab and a movement lab.

The topic of consciousness is ubiquitous present in my research, since I am mainly concerned with aspects pertaining to the mind-body problem (meditation, anomalies, mind-body medicine). With respect to the meeting maybe the most interesting project I have to offer is the neurophenomenological approach to decision making and voluntary action initiation. We collaborate with an outstanding meditation expert in these projects, who is able to provide very accurate, detailed and precise introspective accounts. We performed several times the Libet Experiment on voluntary action with him and were able to get new insights into the decision processes to start a movement on one hand and the experience of inner urges on the other hand. His introspective reports could be successfully linked to the EEG data recorded in parallel, thus demonstrating the feasibility and fruitfulness of this approach. We were able to propose a new hypothesis on how to solve the Libet paradox on free will which is partially based on this research. I will attach a paper on this.



## Idan Segev

I am a professor in Computational Neuroscience at the Hebrew University of Jerusalem. My research team utilizes theoretical/simulation tools to unravel how cortical neurons and networks in the mammalian brain, including that of Humans, perform specific computations – such as “orientation selectivity” in the visual system. I take a keen interest in the connection between Art and the Brain and have recently joined, as a co-Chief Editor, *Frontiers for Young Minds* – an open access journal written by prominent scientists and reviewed by 10-15 years old kids – the target audience for this unique journal.

My interest in the brain was originally invoked by the puzzles of consciousness and other high-level phenomena such as emotions. I decided to explore simpler, more trackable, scientific questions but continued to follow the progress on the scientific quest for consciousness. One cannot avoid but noticing the large gaps in our understanding of this highly rich and diverse phenomenon. I believe that these gaps are partially due to the artificial dichotomy between science and other disciplines that study consciousness. I also believe that self-reflection, e.g., via meditation on conscious processes, including on the scientific process itself, is badly



missing during our daily practice of Science. I am therefore enthusiastic to be a learner in this unique encounter on "*Perspectives on consciousness*", hoping that it will illuminate new ways of understanding ourselves as conscious and creative beings.



## Noa Segev

An explorer of consciousness through movement, science, meditation, energy work and a strong dedication to self-reflection. I completed a BSc degree in Physics and I'm currently graduating a MSc degree in Energy Engineering. In the past decade I have been exploring various contemplative practices that address mental activity regulation, self boundary manipulation, sense perception alteration and more. As time passed the gap between my contemplative and scientific worlds have become burdensome and I started to search for ways to bridge the two. The more I'm delving into this search, the more my certainty rises that seemingly unrelated research methodologies could be intertwined in order to gain new and valuable knowledge. In my experience, meditative and self-reflective practices provide great insight and deep understanding of the nature of reality, whereas scientific practices allow concretization, precision and a common ground for the study of a phenomenon. For me, this workshop is a meaningful and courageous first step into testing new bridging ways to study and enhance the human experience.



## Orly Shenker

Orly Shenker is a Professor at dept. of philosophy at the Hebrew University of Jerusalem. She has written on the foundations of classical and quantum statistical mechanics and on the rationality of science.

The supposition that the brain partakes in bringing about the mind gives brain research its special significance, and one task of brain science is to find out how the brain does that. In answering this question there are, in contemporary science and philosophy, two families of ideas, call them materialism and functionalism, including computational functionalism: materialism (or: reductive type identity physicalism) is the idea that all the facts – including facts about the mental – are physical facts; and computationalism is the idea that the relation between minds and brains is the one obtaining between software and hardware. My research (in collaboration with Prof. Meir Hemmo from U. of Haifa) has two major tasks. (I) One task is to establish materialism as the best explanation of the mind. Materialism, as a theory of the mind, is (surprisingly, perhaps) advocated by very few philosophers and scientists. This unfortunate state of art is due to the fact that the available materialist theories were bad ones. We set out to propose a better theory of materialism, which we call Flat Physicalism. Flat Physicalism, which is based on recent discoveries in the foundations of physics, fares much better than its alternatives in explaining in what sense the brain can be said to give rise



to the mind, and consequently, what sort of things scientific brain research should look for. (II) Our second task is to establish that functionalism, including computationalism, is a form of mindbody dualism. Equivalently, we establish that the idea of "non-reductive physicalism" with its "multiple realizability" (either with "supervenience" or without it) is inconsistent. Importantly, we think that although mind-body dualism is coherent, and in this sense, it could be a true theory of the world (unlike the incoherent "non-reductive physicalism"), it is not a fruitful theory in the sense that it lacks any empirical implications and does not suggest any further research. This project connects with the aims of the workshop in the following ways. 1. Scientific brain science searches for, and is guided by, correlations between mental processes and behavior or brain processes. In order to discover such correlations, it is desirable that brain scientists not only consider the reports of people engaged in contemplative practices, but also engage in such practices themselves, and thus increase their ability to produce detailed and nuanced descriptions of mental experience. 2. At the same time, if indeed the mental is material (as in Flat Physicalism) then – when science will understand how the material is mental – the spiritual (in the sense of mental) goals of contemplative practitioners would be achievable by material manipulations of their brains, in a way that may even be faster, stronger and more reliable than the practices they now employ.



### Eviatar Shulman

Eviatar Shulman teaches and studies Buddhism and Indian religion and philosophy in the departments of Asian and Religious Studies at the Hebrew university of Jerusalem. His current research investigates the composition of the early discourses attributed to the Buddha. Earlier, his main work was in Buddhist philosophy and meditation theory, including his 2014 monograph with Cambridge titled "Rethinking the Buddha: Early

Buddhist Philosophy as Meditative Perception."

My interest in consciousness takes different shapes. A deep-seated intuition I have been contemplating over the years is that consciousness is ontologically prior to matter, an idea that receives diverse articulations in Indian and Buddhist philosophy. This implies that awareness and understanding actually effect the world. From this point of view, theories of reduction are off the mark, and indeed I find them problematic. This means that in the study of consciousness I am interested in the metaphysics in which it is embedded, and even suspect that perhaps more than one metaphysic may be real. While I am drawn to an attempt to think these issue through from a philosophical perspective, as well to investigating their articulations by contemplative practitioners, mainly in India, in a more historical approach, there remains a personal dimension to this pursuit. That is to say that I am open to the possibility that a deep study of consciousness is actually a study of ourselves and our place in the world.



## Narayanan Srinivasan

Professor and Head at the Centre of Behavioural and Cognitive Sciences (CBCS), University of Allahabad. Dr. Srinivasan has been a visiting scientist at the Riken Brain Science Institute and Visiting Professor at University of Rome. He has a Master degree in Electrical Engineering from Indian Institute of Science and PhD in Psychology from University of Georgia.

He worked as a postdoctoral fellow at the University of Louisville. He also worked at the Nanyang Technological University in Singapore for two years before joining one of the first centres for Cognitive Science in India. He has been working at CBCS for the past fifteen and a half years. Dr. Srinivasan is interested in understanding mental processes especially attention, emotions, consciousness, self, and decision making using multiple methodologies. Dr. Srinivasan has edited nine books and four special issues. He has more than 150 journal publications, book chapters and full papers in conference proceedings. Dr. Srinivasan is a fellow of Association for Psychological Science, National Academy of Psychology (India), and Psychonomic Society. He is currently an associate editor of *Frontiers in Cognitive Science*, *Cognitive Processing*, *Royal Society Open Science*, and *Neuroscience of Consciousness*. He is currently the President-Elect of National Academy of Psychology (India).

Empirical work on consciousness of our work focuses on the following aspects: (a) Relationship between attention and awareness, (b) Sense of Agency and Volition and (c) Effects of meditation on visual and time perception. The work on attention and awareness has focused on visual awareness and has shown that spatial attention influences emotional appearance (makes expressed more intense) and scope of attention influences phenomenal aspects of color afterimages. We have studied sense of agency using an event-control approach and have shown that control achieved at different hierarchical levels dynamically influence sense of agency. We have shown that intentions influences time perception and intentional binding. In addition, self-associated stimuli show more intentional binding. The studies on meditation have shown that meditation training influences phenomenal aspects of color afterimages. In addition, perception of time changes as a function of meditation training. Concentrative meditation training also influences perception of time at the local level in the context of different hierarchical levels of processing.





## Naftali Tishby

A theoretical physicist by training and a professor of computer science and computational neuroscientist at the Hebrew University of Jerusalem. He is considered "the father" of Machine Learning research in Israel. Among the founders of the Hebrew University's Interdisciplinary Center for Neural Computation, the Edmond and Lily Safra Center for Brain Sciences, and the Sudarsky Center for Computational Biology.

He works on the mathematical and statistical theory of learning, biological adaptation, and sensing-acting-cycles. Tali is best known for his principled applications of information theory and statistical mechanics to machine learning and biological information processing. His Information Bottleneck principle was applied to various domains, from language evolution and development, to auditory perception and motor control. His recent Information Bottleneck theory of Deep Neural Networks is considered one of most comprehensive theories of large scale learning. He also introduced, together with Bill Bialek, the concept of predictive information, which he then used to model the cognitive perception-action-cycle. This approach also suggests concrete computational models of attention, awareness, and possibly - different states of consciousness.



## Mathis Trautwein

After finishing my psychology studies I completed a PhD in cognitive neuroscience at the Max Planck Institute for Human Cognitive and Brain Sciences, where I contributed to the ReSource project, a large-scale longitudinal mental training study. Currently I am conducting my postdoctoral research at University of Haifa in the lab of Dr. Aviva Berkovich-Ohana.

My research addresses processes underpinning the sense of self, attention, social cognition and social affect. I investigate how these domains of human experience draw on general and specific processes, and in particular, how self/non-self boundaries act as a guiding principle. Hereby, I am invested in the idea that a synthesis of first-person and third-person approaches is essential to foster our understanding of these phenomena. In terms of third-person methodologies, I draw on behavioral, physiologic and neural measurements, including EEG, MEG and fMRI. Regarding first-person methods, I pursue the idea that micro-phenomenological interview methods as well as long-term meditation expertise can provide rich and reliable information about the structure and dynamics of experience.