Varela Awards

Neuroscientist, philosopher, and Mind and Life co-founder Francisco Varela (1946-2001) believed that contemplative training offered modern science novel methods for investigating the depth of human experience. In his vision, contemplative training such as meditation not only provided a new domain for scientific study, but also offered resources for advancing scientific models of consciousness, emotion, and cognitive processing.

The Mind and Life Summer Research Institute and accompanying Francisco J. Varela Awards for Contemplative Research are arguably the most influential programs stimulating new research in the field of contemplative science today. These programs advance the training of a new generation of interdisciplinary scholars exploring the influence of contemplative practice on mind, behavior, brain function, and health, including the potential role of contemplative methods in shaping and enriching human experience, consciousness, and society.

The Summer Research Institute is a week-long annual event that fosters collaborative research in behavioral science, neuroscience, clinical science, and the humanities through a process of inquiry, dialogue, and collaboration with contemplative practitioners and scholars. The Varela Awards are grants of up to $15,000 awarded annually to select graduate students and post-doctoral fellows who have attended the Summer Research Institute. These awards fund scientific and scholarly examinations of contemplative techniques, with the ultimate goal that findings will provide greater insight into the mechanisms of contemplative practice and its application for reducing human suffering.
GROWING THE FIELD OF CONTEMPLATIVE STUDIES THROUGH THE VARELA AWARDS

130 VARELA AWARD WINNERS
$1.79 MILLION IN GRANTS
12 SUMMER RESEARCH INSTITUTES
1,200+ ATTENDEES

To be eligible for a Varela Award, the applicant must have attended the Mind and Life Summer Research Institute within the last five years.
As a donor to the Varela Awards from their inception, we have found that these modest grants have had a remarkable impact—it is profound.

- Barry Hershey
Hershey Family Foundation
2004 Awardees

WILLOUGHBY BRITTON
University of Arizona
Mindfulness-based interventions for depression: possible neurophysiological mechanisms

JASON T. BUHLE
Columbia University
The functional plasticity of attention

RYAN T. CANOLTY
University of California-Berkeley
Understanding the neural correlates of attention

ARNAUD DELOMÉ
University of California-San Diego
Neural correlates of meta-consciousness events as experienced during Zen meditation practice

CATHERINE ORTNER
University of Toronto, Canada
Effects of mindfulness meditation training on attentional control in neutral and emotional contexts

BRIAN N. PASLEY
University of California-Berkeley
Investigation of attentional modulation in visual cortex during meditation

ELIZABETH KIMBROUGH PRADHAN
University of Maryland School of Medicine
MBSR, well-being, and immune changes among rheumatoid arthritis patients

HILARY A. TINDLE
Harvard Medical School
Mindfulness meditation for reduction of smoking craving: an fMRI investigation
training promotes social and emotional competence in the teacher participants resulting in improvements in classroom climate and child learning behaviors. The sample included 21 preschool through grade 5 teachers composed of 13 from the intervention group and 8 from the control group. Intervention group teachers participated in Cultivating Emotional Balance (CEB) a training that involves experiential exercises, didactic presentations and homework related to meditation and emotion. The training resulted in improved well-being among the teachers. The differences in behavior management, productivity, and students’ ability to handle transitions well, follow rules and solve problems had medium to large effect sizes that favored the trained group over the control group. Building upon this research, the CARE for Teachers program was developed to more specifically address teachers’ stress. Over the past ten years, we have received two federal grants to further develop and study this program. Currently we are completing a large randomized trial taking place in New York City with approximately 200 elementary teachers and over 5000 students. So far the results indicate that CARE improves teachers’ self reported well being and shows observable improvements in the classroom. Next steps include analyzing the student data to explore whether CARE also improves student outcomes. Research conducted at University of California-San Francisco.
2005 Awardees

DURWIN FOSTER
University of British Columbia, Canada
Establishing mindfulness and mind wandering as mediators of patient benefit in MBCT

JOSHUA GRANT
University of Montreal, Canada
The neurobiology of mindfulness meditation for the control of pain

BRENT HUGHES
Columbia University
Meditation-induced changes in anticipation and experience of pain

CENDRI HUTCHERSON & EMMA SEPPÄLÄ
Stanford University
Investigating the correlates and consequences of directed loving-kindness meditation

SAHIB KHALSA
University of Iowa
Neural systems supporting interoceptive awareness in experienced and beginning meditators

ANTHONY KING
University of Michigan
Feasibility, clinical acceptability, and efficacy of a mindfulness-based group therapy intervention for PTSD

ADAM SAFRON
University of Pennsylvania
Neural effects of mindfulness meditation training on working memory

MICHAEL SPEZIO
California Institute of Technology
Trust and Christian contemplative practice: A social neuroscientific study of spiritual capital in a contemplative tradition

MOLLY STEWART LAWLOR
Yale University
Effectiveness of the Mindfulness Education Program on children’s social-emotional competence, psychological well-being, and stress reactivity

DEIDRE KOLARICK REIS
Yale University
Regulating emotion in social situations: an fMRI study of experienced Buddhist meditators
The effects of mindfulness meditation training on cognitive and emotional processing associated with the perception of pain in fibromyalgia

Growing evidence suggests that biases in fibromyalgia (FM) patients result in symptoms of emotion dysregulation and exacerbation of musculoskeletal weakness and chronic pain. The original goals of this mixed methods study were to investigate the effects of a mindfulness-based intervention (MBI) on attentional and emotional processing in FM. In addition to reports of symptom reduction, qualitative coding techniques revealed that the 8-week MBI resulted in meaningful changes in participants’ relationship to and understanding of their pain and associated symptoms that were not revealed in psychological self-report assessment. Cognitive measures of attentional biases associated with processing pain-related threat revealed that those participants exposed to the MBI had decreased non-conscious avoidance, increased engagement, and less attentional fixedness with threat. Lastly, those participants exposed to the MBI were found using fMRI to have decreased activity in pain circuitry during anticipation of acute pain. Such data suggest mindfulness may target, and reduce, an emotionally avoidant model of threat appraisal in FM. Research conducted at University of Utah.

“...I think Mind and Life is the support, the seed, the catalyst for this whole field and will continue to spread that methodology. Which I think is the most powerful way we have to understand the mind, its workings and what the potential is, or the upside of human potential.”

-Daniel Goleman
Author, Psychologist
Mind & Life Institute Board Member
We tested the claim that meditation dissolves the self, wondering how this could be adaptive in modern life where we need a sense of our and others’ identities to function. We hypothesized that mindfulness changes the nature of self-reference rather than obliterating it, allowing access to an experiential, momentary sense of identity. In the experiment, we compared participants’ abilities to switch between conceptual and experiential modes of self-reference, what we called a ‘judging’ vs. ‘sensing’ mode of being. Participants completing an 8 week mindfulness-based stress reduction course had a greater ability to engage in visceral, sensory self-awareness, demonstrated by novel recruitment of sensory brain regions. They did not, however, cease to activate conceptual self-representations, but acquired more flexibility in the ability to navigate between these states. The study therefore supports the notion that mindfulness is helpful by removing the primacy of the conceptual self, opening the mind to noticing habits and preferences that emerge in the moment. Research conducted at University of Toronto, Canada.
2006 Awardees

CHRISTOPHER BROWN
University of Manchester, UK
Electrophysiological and behavioral assessment of a mindfulness-based pain management program for patients with chronic pain

CATHERINE CRANE & THORSTEN BARNHOFER
Warneford Hospital, UK
Using MBCT to prevent relapse to suicidality in patients suffering from ongoing depressive symptoms

SANDRA DIVITALE
Emory University School of Medicine
Effects of MBSR on mind and brain in returning Iraqi veterans

RADHI RAJA
University SIM, Singapore
Study of mindfulness meditation on stress reduction and attention regulation in adolescents with mild learning disabilities

MANISH SAGGAR
University of Texas-Austin
Developing a computational model for meditation using cross cortical synchrony in EEG data

JASKIRAT (HEATHER) WILD
Oregon Health and Sciences University, School of Medicine
White tantric kundalini yoga: physiological, behavioral, and EEG effects of an intensive and immersive yogic meditation experience
Addictions are some of the most common healthcare problems in the world, and are difficult to treat, partly owing to stress-induced relapse. We examined the extent to which mindfulness training affected relapse as well as physiologic responses to stress in individuals with alcohol and cocaine dependence. We found that mindfulness training was as good as gold standard Cognitive Behavioral Therapy in preventing relapse to use, and was superior in attenuating psychological and physiological responses to personalized stress induction. These findings suggest that mindfulness may be a useful treatment for addictions and key elements of the addictive cycle. 

*Research conducted at Yale University School of Medicine.*
Compassion is the feeling of caring for and wanting to help others who are suffering. We investigated whether compassion could be cultivated through meditation training using an online intervention. We predicted that practicing compassion would increase altruistic behavior (impacting another at the cost to oneself) as well as brain responses to human suffering. After two weeks of daily online training, we found that participants who learned compassion were more altruistic in an economic exchange game compared to the control group (who learned how to reframe stressful thoughts), and spent almost twice as much money as the control group. Greater altruism in the compassion group was associated with changes in the brain's response to human suffering in regions involved in empathy and increasing positive emotions. This work suggests that compassion is indeed an emotional skill that can be trained. Audio files of Compassion Training and Reappraisal Training are available for download. Research conducted at University of Wisconsin-Madison.

Amidst a growing number of studies of the effects of meditation and mindfulness on cognition, relatively little is known about what exact cognitive mechanisms are affected by meditation practice. In this Varela project, I used computational models of cognition to explain what cognitive mechanisms are being impacted by meditation practice. Specifically, I tested meditators before and after they went on a retreat on a visual recognition memory task, and showed how they could maintain these visual stimuli with less “mental noise” relative to a control group that just went about their daily life. This first study showed how helpful it is to use computational models to study the effects of meditation. I am currently following up on this work by applying models to more cognitive tasks, and by making an actual model of the meditation process itself. Research conducted at University of Pennsylvania.
2007 Awardees

JOANNA ARCH
University of California-Los Angeles
Different approaches to emotion regulation: MBSR and CBT in the treatment of anxiety disorders

JENNIFER DAUBENMIER
University of California-San Francisco
Effects of mindfulness meditation on cell aging processes

TERESA HAWKES
University of Oregon
A randomized controlled single-blinded pilot trial to compare effects of concentrative sitting meditation to moving meditation (tai chi) training on attentional network efficiency

ELIZABETH HOGO
Massachusetts General Hospital, General Clinical Research Center
Neuropeptide levels in meditation

BRITTA HÖLZEL
Massachusetts General Hospital
Does mindfulness training change the processing of social threat?

MICHAEL HOVE
Florida Atlantic University
The dissolution of self during rhythmic motor behavior

KRISTEN JASTROWSKI MANO
Children’s Hospital of Wisconsin
MBSR for the treatment of pediatric chronic pain

ZEV ROSEN
University of Pennsylvania
Neural effects of mindfulness training on adults with ADD

ANNA-LEILA WILLIAMS
Yale University
Development and testing of determinants of meditation practice

LAURA VAN WIELINGEN
Tom Baker Cancer Centre – Holy Cross Site, Canada
How does MBSR improve psychological functioning for cancer patients?

FADEL ZEIDAN
Duke University
The influence of meditative experience on pain perception
Posttraumatic stress disorder (PTSD) is a common and often devastating disorder affecting nearly 10% of the population, and ~1 out of 5 military veterans who served in Iraq and Afghanistan. Mindfulness meditation, and related techniques such as Loving-Kindness and Self-Compassion training, have been suggested to be useful in the treatment of trauma, but at the time of the award there were no published studies. My Varela Awards allowed us to conduct a trial of Mindfulness-Based Cognitive Therapy (originally developed for depression relapse prevention) lightly adapted for combat PTSD at a VA PTSD clinic, to test acceptability and proof of concept, followed by a PTSD-specific group therapy with Mindfulness, Self-Compassion, and Exposure components, and pre-post emotional neuroimaging studies. We demonstrated that Mindfulness and Self-Compassion are acceptable to combat veterans and helpful for PTSD, and identified changes in brain functioning associated with Mindfulness training. The Varela Awards made it possible for us to obtain federal funding for further research, and we believe helped to make possible additional studies of Mindfulness for PTSD nationwide. Research conducted at University of Michigan.

- Wendy Hasenkamp
  Senior Scientific Officer, Mind & Life Institute
ERIC GARLAND
ASSOCIATE PROFESSOR,
UNIVERSITY OF UTAH
Biopsychosocial assessment of a mindfulness-oriented cognitive intervention for alcohol dependence

I developed and tested a novel contemplative intervention for addiction, Mindfulness-Oriented Recovery Enhancement (MORE), by translating findings from neuroscience into strategies designed to ameliorate addiction, stress, and (physical and emotional) pain. MORE is a mental training program that unites complementary aspects of mindfulness training, cognitive-behavior therapy, and principles from positive psychology into an integrative treatment strategy. With my Varela Award, I conducted a pilot randomized controlled trial (RCTs) of this intervention in a low-income, inner city sample of alcohol dependent adults, and found that MORE led to significant reductions in stress and thought suppression, as well as significant decreases in neurocognitive and physiological reactivity to stress and alcohol cues. Subsequently, I received funding from the National Institute on Drug Abuse to conduct two RCTs of MORE for prescription opioid misuse, and found this intervention to reduce drug craving by enhancing sensitivity to naturally rewarding objects and events in everyday life. Research conducted at University of North Carolina-Chapel Hill.

BALJINDER SAHDRA
RESEARCH LECTURER,
AUSTRALIAN CATHOLIC UNIVERSITY, AUSTRALIA
Measurements and correlates of non-attachment

Some of the earliest known writings on the constructs of mindfulness and nonattachment date back 25 centuries in Eastern contemplative traditions. Empirical research on mindfulness has been well established in the last couple of decades, but nonattachment is a relative newcomer in the psychological literature. Nonattachment can be defined as a flexible, balanced way of relating to one’s experiences without clinging to or suppressing them. The first empirical investigation on nonattachment, supported by this Varela Award, was published in 2010. Since then, there have been a number of studies showing that nonattachment is empirically distinguishable from related constructs such as attachments in close relationships and various aspects of mindfulness, and has many benefits such as high life satisfaction, effective pursuit of valued goals, and prosocial behavior. Interventions directly targeting mindfulness and nonattachment may be more effective in producing personal and interpersonal benefits than either approach alone. Research conducted at University of California-Davis.
**Neural Substrates Underlying Modalities of Awareness in Mindfulness Practice**

**Vago, D.R., Pan, H., Silbersweig, D.A., Stern, E.**

Functional Neuroimaging Laboratory, Brigham & Women’s Hospital, Dept. of Psychiatry, Harvard Medical School, Boston MA 02115

**Preliminary Results**
- A whole brain voxel-wise GLM was utilized to examine the effect sizes of the key condition contrasts via measuring the plateaus magnitudes in BOLD signal during the peak states against the default state.
- Preliminary results illustrate modality-specific activation along with significant activation in the integrative thalamic-cortical network (PFC, ACC, DMPCC, AIC, IPL) basal ganglia, primary sensory and somatic cortices that correlates with bins of expertise (and not total FFMQ-mindfulness scores). Decreases were also found in the self-reflective, hippocampal-cortical-memory network, limbic area (Amy, Hpc, Hyp).

**Conclusions**
- Initial data provide preliminary support for (1) the model of mindfulness proposed by Vago & Silbersweig (2012), (2) specific functional and anatomical substrates for cognitive attention and affect across multiple modalities and their interaction to non-mediation default states of mind.
- These data identify specific mechanisms underlying specific modalities of mindfulness practice and can inform areas for potential therapeutic relevance in neuropsychiatric disorders.

**Model for Mindfulness (Open Monitoring Meditation)**

**Found & Objectives**
- Psychiatry has rapidly been subsumed into current treatment approaches, with the mechanisms by which interventions are currently unclear. The developed a systems-based model of cognitive and neural changes underlying mindfulness (Vago & Silbersweig, 2012).
- Mindfulness training interventions are guided by the idea that training can lead to improved well-being and outcomes in clinical settings (Kabat-Zinn, 1999).
- The use of training and self-regulation as a means of facilitating and increasing self-awareness (Kabat-Zinn, 1999).
- This involves training in the skills of attention and awareness, often referred to as mindfulness (Kabat, 1990).
- The training is designed to enhance self-awareness and self-regulation of attention and emotions (Kabat-Zinn, 1999).

**Networks**
- Effective Mindful Engagement
- Connections between neural networks
- The mind of the moment, present moment awareness
- For mindfulness and meditation practices

GroupMeans correlated values of experience
2008 Awardees

SEAN BARNES
Binghamton University
Identifying the mechanisms of action in MBCT

LISA FLOOK
University of Wisconsin-Madison
Mindfulness-based kindness curriculum for preschool children: a replication and extension

BRIAN GALLA
University of Pennsylvania
Examining the psychological effects of intensive meditation retreats for teenage youth

SHEILA GARLAND
Tom Baker Cancer Centre, Holy Cross Site, Canada
An objective comparison of cognitive behavioral therapy and mindfulness-based stress reduction for the treatment of insomnia in individuals with cancer using wrist actigraphy: a randomized non-inferiority trial

WENDY HASENKAMP
Emory University
Real-time dynamics of cognitive processing during meditation: a subject-driven fMRI investigation

BROOKE LAVELLE-HEINEBERG
Emory University
Study to design and assess the validity of the Emory Meditation Practice, Tradition, and Experience (EMPTE) scale

BRANDON KING & ANTHONY ZANESCO
University of California-Davis
The interrelationship between cognitive control and affect in an intensive Vipassana retreat

SUSANNE LEIBERG
University of Zurich, Switzerland
The neural and behavioral correlates of a neurofeedback-based metta meditation training

NATHANIEL LEPP & ELLEN DARLING
Brown University Medical School
School-based mindfulness training in middle school and college students: effects on emotion, objectively measured sleep, and attention; effects on mindfulness, self-compassion, and depression in women

HOLLY RAU
University of Utah
Application of the neurovisceral integration model to mindfulness: implications for stress regulation and the development of insomnia

TERESA SIVILLI
Emory University
The FACE Study: Faces, Attention, Compassion, & Emotion

NICHOLAS VAN DAM
University at Albany
Exploring the impact of meditation on stress and psychopathology: attentional allocation as a potential mechanism of active change following meditation training
AVIVA BERKOVICH-OHANA
Research Lecturer, University of Haifa, Israel

Meditation and non-linear neurodynamics: From state to trait

Receiving the Varela Award was instrumental in my PhD research, which implemented neuroscientific tools in the study of meditation. This project, conducted in Bar-Ilan University, Israel, studied electrophysiological alterations as a result of mindfulness meditation expertise. The results provided evidence suggesting contemplation-induced neuroplasticity in several important cognitive functions. These included: 1) Sense of self: in the mindfulness meditation practitioners, we found a reduction in frontal gamma (25-45 Hz) activity, indicative of reduced default mode network activity. The default mode network has been related to mind-wandering, as well as autobiographic self-related processing, both previously linked to reduced emotional well-being; 2) Attention: the mindfulness meditation practitioners showed heightened posterior gamma activity, which has previously been linked to attention; 3) Time: mindfulness meditation induced an increase in subjective time units, interpreted as enhanced momentary experience; and 4) Creativity: mindfulness meditation enhanced creativity, measured as the capacity to produce work that is novel and original. Research conducted at Bar-Ilan University, Israel.

JULIE BREFCZYNSKI-LEWIS
Assistant Professor, West Virginia University

Changing our perception of others through compassion meditation

Interpersonal stress from difficult relationships with coworkers, family and others can be severe. A compassion practice was taught to help reduce the adverse reaction to difficult persons, using a relaxation practice as a control. Although both compassion and relaxation groups rated pictures of their difficult persons more positively after several weeks of practice, only the compassion group had increased trust and more positive ratings of strangers. After inducing a ‘state’ of compassion in the functional magnetic resonance imaging (fMRI) brain scanner, compassion subjects showed a decrease of right amygdala activation and an increase in face processing brain regions to disliked faces. It may thus be helpful to practice compassion practice, especially right before having to deal with difficult persons in the real world. These pilot data were used to procure multiple funding sources for a smartphone app version for both normal and for heart failure patients – a group who is very vulnerable to stress. Research conducted at West Virginia University.
2009 Awardees

**BRENDA DYER**
University of British Columbia, Canada
*Relational processes in learning mindfulness: an action-theoretical perspective*

**MELISSA ELLAMIL**
University of British Columbia, Canada
*Investigating the neural basis of spontaneous thought with real-time fMRI and contemplative mental training*

**NORM FARB**
University of Toronto, Canada
*How mindfulness impacts selective attention during emotional challenge*

**ELLEN KATZ**
University of Toronto, Canada
*Attending to clinical social work practice: mindful attention as holistic competence background and relevant literature*

**LAURA KIKEN**
Virginia Commonwealth University
*The effect of mindfulness on physiological awareness: blood glucose estimates and disease management in type 2 diabetics*

**EMMA LAWRENCE**
King’s College, UK
*The impact of evaluative vs. experiential self-focus on emotional response*

**DAVID LIPSCHITZ**
University of Utah
*Effects of mind-body interventions in cancer supportive care: oxytocin as a biological correlate of well-being and connectedness*

**ROISIN O’DONNELL**
University of Arizona
*The effectiveness of MBSR as an intervention among elderly family caregivers of persons with neurocognitive disorders*

**TUCKER PECK**
University of Arizona
*The effects of mindfulness meditation on sleep electrophysiology and duration*

**DAVID PERLMAN**
University of Wisconsin-Madison
*Hedonic sustainability in the BOLD response to selfish and altruistic rewards*
Many people with substance use disorders have difficulty controlling impulses. After mindfulness training, some people report increased self-control. The Varela Award supported a clinical trial studying the effect of mindfulness training on impulsivity and inhibitory control in tobacco smokers using objective behavioral measures. Our preliminary data suggested that after 4 weeks of intensive behavioral training, smokers improved their ability to stop a motor impulse, which may reduce relapse risk. Smokers randomized to mindfulness training had the largest improvement in inhibitory control. High levels of non-judgment may potentiate the benefits of mindfulness training for smokers, suggesting treatment matching possibilities. We tested an accelerometer-based ecologic momentary assessment device to measure meditation practice time during clinical trials. Following this study, we received grants for a Center for Mindfulness and Compassion at Cambridge Health Alliance and a large implementation project integrating mindfulness training into patient-centered medical home primary care sites across the healthcare system. Research conducted at Harvard Medical School/Mass General Hospital.
ment and neurophysiologic processes by engaging specific attentional systems. Regulation of attention is the central commonality across many divergent methods, and meditative styles can be usefully classified on an attentional spectrum from attentional focus/concentrative to open-monitoring/mindfulness. One of the common areas of overlap between these meditative styles is the effect on the lived self-experience in meditators, as one of the goals of meditation is the transformation of one’s experience from a more ego-centered perspective towards that of a more world-centered perspective. My Varela project studies the neural processing of hearing self vs. other names in advanced meditators that practice focused attention vs. those that practice open-monitoring. The goal is to establish whether a “hard wired” brain mechanism for automated responding to one’s own name is modulated by intensive meditation practice, providing experimental insight into the transformation of self-referential processing induced by such practice. Preliminary analysis of the data has indicated both state and trait-related changes to self-related processing comparing long-term meditators to controls and further analysis is currently underway to more fully elucidate these changes. Research conducted at University of California-San Diego.

"Often they [students] were in institutions where they didn’t have much support for doing that kind of work.”

- Al Kaszniak
University of Arizona
Mind & Life Institute Fellow
2010 Awardees

**MICAH ALLEN**
Aarhus University, Denmark
The neurophenomenology of mindfulness: metacognitive awareness as a mechanism for adaptive change

**GAELLE DESBORDES**
Boston University
Neural and physiological correlates of Tibetan energy-channel meditation in highly trained practitioners

**TIM GARD**
Bender Institute of Neuroimaging, Germany
The effects of Kripalu Yoga on the brain: A longitudinal cortical thickness and diffusion tensor imaging study

**ANDREA HAYES**
University of Wisconsin-Madison
Differential effects of mindfulness and yogic breathing on cognitive and emotional processes

**KRISTEN LYONS**
University of Minnesota
The effects of mindfulness meditation training in early childhood

**EVA OBERLE**
University of British Columbia, Canada
Mindfulness-based education in the elementary school classroom: individual and joint effects of a teacher and student program on children’s classroom behaviors, peer relations, classroom hierarchy, and stress reactivity

**JOSE RAUL NARANJO**
University Medical Center Freiburg, Germany
EEG spectral signatures of the impact of mindfulness meditation on perceptual-motor awareness and self-agency

**AUTUMN WILEY-HILL**
University of Arizona
Exploring the effects of mindfulness meditation on self-control failure
JESSICA FLYNN
Graduate Student, Kent State University
Effects of training in loving-kindness meditation on underlying approach and avoidance motivations
Loving-kindness meditation (LKM) has positive effects on well-being and holds promise for augmenting current cognitive-behavioral therapies (CBTs) for mental health disorders. The current study, funded by a Varela Award, examines one possible mechanism by which LKM has this effect: a weakening of the effect of maladaptive motivational tendencies on behavior. To do this, we are testing the effect of an 8-week online program in LKM on amygdala activation to approach and avoidance stimulation using functional magnetic resonance imaging (fMRI). Twenty-four participants are being randomly assigned to receive the LKM program before (Immediate) or after (Delayed) the fMRI scan. We expect to find that training in LKM leads to a decreased association between amygdala activation and neuroticism in the approach of negative stimuli and higher amygdala activation during approach of positive stimuli. Preliminary analyses suggest the online LKM program is feasible and has expected effects on self-report measures. *Research conducted at Kent State University.*

DANIEL LEVINSON
Graduate Student, University of Wisconsin-Madison
Breath counting: Developing a behavioral measure of mindfulness
Mindfulness shows promise for improving health, but unbiased measurement of mindfulness is lacking. Currently, the only way to measure how mindful someone is to ask, and answers may be biased. In contrast, breath counting, a longtime adjunct of mindfulness training, offers an objective measure of accuracy resistant to bias. In research funded in part by a Varela Award, we show breath counting accuracy is a reliable and valid measure associated with greater meta-awareness, less mind wandering, better mood, and greater nonattachment. In addition, we developed an online breath counting game that increased players’ mindfulness more than randomization to control training conditions. These findings suggest breath counting is a rigorous method for studying mindfulness skill and its correlates, as well as a training tool with potential clinical relevance. *Research conducted at University of Wisconsin-Madison.*
Do white matter changes contribute to improved fear extinction following mindfulness training?

While several studies had reported differences in brain structure and function between experienced meditators and non-meditators, controlled longitudinal studies were missing for a long time. Supported by Varela Awards, we set out to investigate neural changes following the 8-week Mindfulness-Based Stress Reduction (MBSR) program in meditation-naïve participants. Study 1 demonstrated increases in gray matter concentration in several brain regions following MBSR, but not in a waitlist control group. Study 2 utilized a randomized actively controlled design with generalized anxiety disorder patients and investigated changes in response to an emotion regulation paradigm in a functional MRI study. Results demonstrated that MBSR lead to changes in activity and functional connectivity within the fronto-limbic system, and that changes were correlated with symptom improvement. These studies contribute to understanding the neural mechanisms of mindfulness practice, in order to enhance knowledge of practices aiming at the cultivation of a healthy mind and increased well-being. 

Research conducted at Bender Institute of Neuroimaging, Germany.

—Autumn Wiley-Hill
2010 Varela Awardee
2011 Awardees

**JESSICA CREERY**
Northwestern University
Can supercharged memory consolidation during sleep boost compassion and pro-sociality?

**JULIA ANN KELLER**
University of New Mexico
An investigation of the impact of mindfulness training on the development of attention and working memory in children

**MICHAEL LIFSHITZ**
McGill University, Canada
Effects of open monitoring on visual search: evidence from eye-tracking, electrophysiology, and phenomenology

**KRISTIN ZERNICKE**
University of Calgary, Canada
The eCALM Study: eTherapy for Cancer Applying Mindfulness

"The Varela awards, to me, demonstrate the true meaning of seeding a field—investing in the young scholars who are doing the deep investigations between science and contemplative studies."

-Barry Hershey
Hershey Family Foundation
PAUL CONDON
Postdoctoral Fellow, Northeastern University
Compassion- and mindfulness-based meditation: Nurturing pro-social behavior and social networks

My Varela Award supported research that investigated the social effects of contemplative practice on real-world interactions in response to the physical pain of others. Specifically, we found that those completing eight weeks of mindfulness- or compassion-based findings were three times more likely to offer their seat to a woman on crutches, even in a social context whose features should attenuate such behavior. The simple presence of two actors and their disregard for the pain of the sufferer constitutes a classic “bystander effect” manipulation where both diffusion of responsibility and norms suggesting an acceptance of nonintervention are heightened. Prior to this work, very little empirical investigation examined the impact of contemplative practice in real-world settings. Moreover, we have recently replicated this effect using a mobile-app for training mindfulness. These findings point to the potential for meditation as a technique for building a more compassionate society. Research conducted at Northeastern University.

FADEL ZEIDAN
Assistant Professor, Wake Forest School of Medicine
Brain mechanisms distinguishing mindfulness meditation-related pain relief from placebo analgesia

Mindfulness meditation has been reliably found to reduce experimentally-induced and clinical pain. However, this effect could be related to conditioning, psychosocial contexts and the belief that one is meditating—all factors associated with the placebo response. Given that the “gold standard” for evaluating the efficacy of clinical interventions is to employ placebo comparisons, it is imperative that meditation be held to similar levels of rigorous examination. To this extent, my Varela Award project involved a large, longitudinal and carefully controlled experiment to examine whether mindfulness meditation engages behavioral and neural mechanisms that are distinct from placebo. Four days of mindfulness-based mental training was compared to: A) a well-validated, four-day placebo-conditioning intervention where subjects were led to believe that an inert cream reduces pain over time, B) a four-day sham-mindfulness meditation intervention where subjects were led to believe they were practicing mindfulness meditation, when in fact they were not, C) a four-day book-listening control condition. Preliminary results indicate that mindfulness produces greater reductions in perceived pain than those produced by placebo and sham-mindfulness meditation. Neuroimaging data confirm for the first time that mindfulness mediation engages brain mechanisms that are distinct from those involved in placebo analgesia and sham mindfulness meditation. The demonstration that mindfulness mediation is distinct from placebo has major implications for health care and will have broad appeal to the lay public. Research conducted at Wake Forest School of Medicine.
2012 Awardees

DEV ASHISH
University of Arizona
Self-compassion and the need of self-preservation

AVIVA BERKOVICH-OHANA
Weizmann Institute of Science, Israel
Exploring mindfulness induced state and trait alterations in “self” networks: a combined fMRI-MEG neurophenomenological study

KAREN BLUTH
University of North Carolina-Chapel Hill
Exploring the impact of a mindfulness intervention on adolescents’ self-compassion and emotional well-being

MICHAEL GOLDSTEIN
University of Arizona
Effects of yogic breathing on sleep and well-being in college students: Exploration of psychophysiological mechanisms

ROBERT GOODMAN
Virginia Commonwealth University
The effect of MBSR on episodic and prospective memory function in aging adults

ELIZABETH GOODMAN GURFEIN
PGSP – Stanford Psy. D. Consortium
Compassion cultivation for physicians-in-training

MONIKA LOHANI
Brandeis University
A longitudinal training study to delineate the specific causal effects of open monitoring versus focused attention techniques on emotional regulation skills

MARINA LOPEZ-SOLA
University of Colorado
Neural effects of mindfulness-based cognitive therapy in remitted patients with chronic history of depression

JORDAN QUAGLIA
Virginia Commonwealth University
From intra- to inter-personal: effects of MBSR on emotion regulation in social contexts

XIOADAN YAN
Massachusetts General Hospital
Intrinsic neural characteristics predict the effectiveness of MBSR training on fear extinction and stress reduction
HANS MELO
GRADUATE STUDENT,
UNIVERSITY OF TORONTO,
CANADA
Making the right choice:
Combining neuroimaging,
computational modeling,
and first-person report
methodologies to unveil
neural mechanisms of
human flourishing
We examine the relation
between positive emotions
and cognition, and argue
that exploration is more than just a response to fulfilling life-
supporting needs such as food and shelter, but that it also
facilitates the development of higher cognitive resources such
as flexibility and creativity, and may further support enhanced
levels of well-being. We propose that positivity is associated
with frontally mediated exploratory capacities that impact the
flexibility and scope of cognition and affect, whereby positive
emotions may help individuals become more flexible, discerning,
and creative in their approach to present experience, while
at the same time building resources for coping with setbacks
and obstacles for the future. It is possible that genetic and
neural mechanisms underpin individual behavioral differences
in exploration. By combining functional magnetic resonance
imaging (fMRI) with genotyping and computational modeling
we aimed to assess genotype-related differences in brain
activity patterns associated with exploratory behavior. Analysis
revealed significant interactions between specific genetic
markers and brain activity in areas of the frontopolar cortex.
Our work shows that dopamine-related genes influence the
neural mechanisms underpinning exploration in humans. More
generally, these results show evidence for different neural
mechanisms implemented by different individuals in exploratory
behavior. Research conducted at University of Toronto, Canada.

KIERAN FOX
GRADUATE STUDENT,
UNIVERSITY OF BRITISH
COLUMBIA, CANADA
The neural basis
of enhanced
introspective
accuracy in long-
term meditation
practitioners
Our minds wander all
of the time – but why
do some people’s
minds wander
to positive, creative, and fulfilling topics, while
others are stuck in cycles of depressive rumination?
Do different neural correlates accompany these
different kinds of mind-wandering (aka ‘spontaneous
thought’)? Our Varela project is investigating these
questions at the neural level with functional magnetic
resonance imaging (fMRI): namely, we are aiming
to distinguish emotionally negative and positive
spontaneous thoughts, and also to differentiate
between mind-wandering that relates to one’s
goals and concerns, versus pure ‘fantasy’ that is
goal-unrelated. Our preliminary results suggest that
positive (vs. negative) mind-wandering recruits reward
circuits in the brain, whereas goal-related (vs. goal-
unrelated) mind-wandering recruits executive brain
areas. This suggests that patterns of mind-wandering
that are more useful, adaptive, and pleasant can be
differentiated at the neural level from non-useful,
depressive patterns of thinking. This implies that
there are measurable brain differences between the
kinds of thought patterns that characterize healthy,
creative people, and patterns that characterize
disorders such as depression. Research conducted at
University of British Columbia, Canada.
The Varieties of Contemplative Experience (VCE) project is a large-scale mixed methods study investigating the spectrum of meditative experiences reported by contemporary practitioners in Buddhist and Abrahamic contemplative traditions. While my responsibilities included coordinating research within both data sets, I specialized in the Abrahamic sample and explored questions such as: What is the landscape of contemporary Jewish, Christian, and Islamic meditation practices and traditions? What are the phenomenological categories and characteristics reported by practitioners and teachers in these traditions and are there textual precedents for them? What are the similarities and differences between the Buddhist and Abrahamic samples in terms of techniques, phenomenology, and interpretive frameworks? Preliminary findings occasioned the most recent Mind and Life Research Workshop in April 2015 and the analysis of the data will continue into the doctoral program I will begin this fall. It is my hope that this research will draw more attention to the incredible richness and sophistication within Abrahamic meditative systems and help to facilitate the expansion of the field(s) of contemplative science to include the practices and insights from both Eastern and Western contemplative traditions. 

Research conducted at Brown University Medical School.

“When I received the award, I was like ‘whoa’, maybe this is possible. Maybe my long term goal of doing this is possible and these people believe in me.”

-Jeff Yanli Lin
2014 Varela Awardee
2013 Awardees

EILEEN CARDILLO
University of Pennsylvania
Neural mechanisms of self-transcendence: insights from noninvasive brain stimulation

LISA MAY
University of Oregon
Does meditation cause pain relief through endogenous opioids?

JOHN Plass
Northwestern University
Neural dynamics of attention and meta-attention during meditation

SEAN PRITCHARD
Fielding Graduate University
Mindfulness and beyond: a qualitative study of advanced Mahasi meditators’ experience

KATHRINE SHEPHERD
Kent State University
Examining the relationship of meditation experience to the neural correlates of spontaneous emotion regulation

SARAH SHORT
University of North Carolina-Chapel Hill
The effects of contemplative training on brain structure and function in six-year-old children

ELIZAVETA SOLOMONOVA
University of Montreal, Canada
Embodied dreaming and procedural memory consolidation following daytime nap in Vipassana meditators and non-meditating controls: a neurophenomenological study

FADEL ZEIDAN
Wake Forest School of Medicine
The role of endogenous opioidergic systems in mindfulness meditation-related pain relief
**RACHEL JACOBS**  
Research Assistant Professor, University of Illinois-Chicago  
Mindfulness Intervention to study the Neurobiology of Depression (MIND)

The Varela Award contributed towards my pilot study testing whether mindfulness can help reduce rumination (a tendency to get stuck thinking about a problem in a non-productive way) and prevent relapse of depression among teens who are currently in remission. To date, 22 teens with a history of adolescent-onset depression have completed functional magnetic resonance imaging (fMRI) scans at baseline and then again 8 weeks later. Half of these teens received the 8-week mindfulness intervention. Teens who received the intervention self-reported a significant reduction in residual depressive symptoms. Preliminary fMRI results suggest that the intervention reduces hyperconnectivity between regions that have been associated with rumination (the default mode network). These teens are being followed for two years after the intervention to test whether mindfulness training prevents full depressive relapse.  
*Research conducted at University of Illinois-Chicago.*

“The Varela award opened the door to funding opportunities and the fast-track to becoming an independent researcher. The Mind and Life organization has been essential in catalyzing many long-lasting relationships and creating an environment to support collaboration.”

-Zev Schuman-Olivier  
2009 Varela Awardee
EMILY LINDSAY  
GRADUATE STUDENT, CARNegie MELLOn UNIVERSITY  
Mechanisms of mindfulness and stress resilience: A mobile app mindfulness training study

Mindfulness meditation continues to gain popularity as a way to combat stress and ease physical symptoms. This public interest is backed by research showing that mindfulness training is effective for reducing stress and improving health. With support from Mind & Life, my research aims to explain how mindfulness reduces stress and improves health outcomes through psychosocial and biological pathways. We partnered with renowned mindfulness instructor, Shinzen Young, to isolate the active components of mindfulness into three 14-lesson audio-guided smartphone training programs. Using these programs, we are testing which underlying components of mindfulness change everyday responses to stress and markers of physical health. An understanding of the active ingredients of mindfulness can help us tailor future training programs for specific populations. This ongoing work will also inform the development of an accessible, interactive mindfulness training system using new media. Research conducted at Carnegie Mellon University.
2014 Awardees

CORINA AGUILAR-RAAB
Institute of Medical Psychology, University Hospital Heidelberg, Germany
The effects of compassion meditation on health and social interaction in depressed patients

DANIEL BERRY
Virginia Commonwealth University
Bridging the empathy gap: Effects of brief mindfulness training on helping outgroup members in need

JAMES FLOMAN
University of British Columbia, Canada
The effects of mindfulness and loving-kindness meditation on teachers’ emotional abilities, compassion, and prosocial classroom engagement

TIM GARD
Maastricht University, Netherlands
Assessing resilience of brain functional networks and fluid intelligence in aging meditators: A combined TMS-fMRI study

BERGLJOT GJELSVIK
University of Oxford, UK
A translational approach to short-circuiting on-going suicidal vulnerability: Understanding brain mechanisms of action

MATTHEW HIRSHBERG
University of Wisconsin-Madison
Mindfulness for pre-service teachers

MICHAEL HOVE
Harvard Medical School
Rhythm induced trance: Using repetitive auditory stimulation to facilitate states of absorption and promote insight

LINDSEY KNOWLES
University of Arizona
Mindfulness-based intervention to examine yearning and grief specific rumination as mediators of grief outcomes in bereaved individuals

DYLAN LOTT
University of Illinois at Chicago
An ethnographic analysis of the integration of contemplatives in neuroimaging laboratories
JEFF YANLI LIN
Michigan State University
The effects of mindfulness on gender stereotype threat

JEFFREY PROULX
Oregon State University
Is mindful meditation effective and culturally relevant for native people?

JUAN SANTOYO
Brown University
Neurofeedback informed meditation techniques (NIMT) for modulating somatosensory alpha activity and acute pain perception: A novel paradigm for treatment development

VÉRONIQUE TAYLOR
University de Montreal, Canada
Mindfulness and the neurophysiological substrates of fear conditioning

 PATRICK WILLIAMS
Claremont Graduate University
Strengthening memories of compassion

“ It’s this new generation which is really going to pave the way, really going to do the solid, foundational work for a field that I think is going to develop for the next century or two.”

-Daniel Goleman
Author, Psychologist
Mind & Life Institute Board Member
the development of institutions such as the Waldorf School, biodynamic farming, and anthroposophical medicine. It is less known that anthroposophy is based on an extensive system of meditative practice. This project is the first qualitative study of anthroposophical meditation worldwide, and aims to give an initial overview of the actual experiences anthroposophical meditators have today. The study is undertaken as part of a larger research project at the Bender Institute of Neuroimaging (University of Giessen) led by Ulrich Ott, and is a collaboration with researchers at Brown University, who have been investigating a variety of other meditative traditions in the recent years. In addition to developing an overview of meditation experience in general, this research also looks specifically into adverse meditation experiences, and what remedies meditators have found useful. Research conducted at Bender Institute of Neuroimaging/University of Giessen, Germany.

How does meditation change the way we interact with other people? The core motivation of my research is to understand how meditation can improve social life. In particular, social support is a key to health and wellbeing, while a lack of support is a major risk factor for morbidity and mortality. I plan to examine whether lovingkindness meditation, intended to engage social connectedness, can enhance mutual feelings of support in conversation. In good communication, the brain activity of a speaker and listener begins to synchronize. This speaker-listener neural coupling will be used as an index of successful communication. I expect that people who engage in brief lovingkindness meditation prior to conversation will show increased neural synchronization and later report enhanced mutual feelings of support. These findings will help us understand the neurocognitive mechanisms of contemplative practice and critically inform future development of meditation-oriented intervention strategies to enhance social life. Research conducted at University of Pennsylvania.
The Mind & Life Institute is deeply grateful to Barry Hershey and the Hershey Family Foundation as a principal partner and sponsor of the Francisco J. Varela Awards. A dear friend of Mind and Life for more than 25 years, Barry has participated in many Mind and Life events and dialogues, and supported key programs and initiatives.

An independent filmmaker, Barry studied filmmaking at the University of Southern California School of Cinematic Arts, where he received his MFA. Earlier, he graduated from the University of Pennsylvania and Harvard Law School and also attended the London School of Economics.

He is currently a Visiting Fellow on the Faculty of Arts and Sciences at Harvard University. In addition to serving on the Mind and Life board, Barry serves on the board of the MIT Dalai Lama Center for Ethics and Transformative Values.

In addition to the Hershey Family Foundation, we want to thank all the generous contributors to the Francisco J. Varela Awards. The John Templeton Foundation, with their philanthropic focus on stimulating research and promoting civil, informed dialogue among scientists, philosophers, and theologians on the big questions of human purpose and ultimate reality, has been a principal partner and supporter of the Mind and Life Summer Research Institute and the Varela Awards since 2004. Other visionary patrons over the years have included Leslie Lykes de Galbert, The Mental Insight Foundation, Francene and Tim Orrok, and several anonymous individuals. On behalf of the Varela Award recipients, and all who will benefit from their research, thank you for your benevolent support!