Center for Neuroscience & Society

University of Pennsylvania



REPORT TO THE INTERNAL REVIEW COMMITTEE

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Submitted April 9, 2016, by Martha J. Farah, Director of the Center for Neuroscience & Society

I. Mission

Neuroscience is giving us increasingly powerful methods for understanding, predicting and manipulating the human mind. Every sphere of life in which psychology plays a central role – from education and family life to law and politics – will be touched by these advances, and some will be profoundly transformed. The mission of the Center for Neuroscience and Society is to increase understanding of the impact of neuroscience on society through research and teaching, and to encourage the responsible use of neuroscience for the benefit of humanity.

II. History

The Center began as the <u>Penn Neuroethics Program</u> in 2004, supported by Martha with money from her chair fund and eventually supplemented with a small grant for speakers from the Templeton Foundation. Participating faculty came from several schools and departments (including Bioengineering, Bioethics, Law, Neurology, Philosophy and Psychology). We had monthly talks by local and visiting speakers, discussion groups of Penn faculty and students, and an informational website offering summaries of neuroethical issues and recommendations for reading, which still operates today as the CNS website. The website won an award (Golden Sparrow Award) and was for years the #1 ranked hit for Google searches of "neuroethics," remaining high today.

In 2007 faculty members from Bioethics approached the Provost asking for support to launch a larger neuroethics initiative. After a series of discussions with Provost Daniels and Vice Provost Fluharty, in which different homes and leadership rosters were discussed, it was decided that the Penn Center for Neuroscience & Society (CNS) would become a Provostial center, in view of its cross-school membership (the Penn Neuroethics Program faculty became the CNS faculty) and its founding directors would be Farah (Director), Anjan Chatterjee (Associate Director) and Stephen Morse (Associate Director). The CNS was founded in 2009 and has contributed in the many ways listed below to the mission just described, as well as establishing Penn as the leading Center, world-wide, for neuroethics, neuroscience and society.

III. People

FACULTY. CNS's 21 faculty come from 11 departments and 6 schools at Penn. They are listed in Appendix 1. Our faculty are actively committed to working on problems at the interface of neuroscience and society and we maintain that standard by listing, under each faculty member's name, a publication that is directly relevant to neuroscience and society. In effect this is a filter, albeit imperfect, that helps attract a committed, focused faculty. We believe our mission is better served this way than by including a larger group of people who express causal interest but have no serious investment in the topic. Other programs, such as Stanford, UBC and Oxford, have fewer faculty members than we do, and those they have are less centrally involved. The CNS faculty leadership spans schools at Penn, with Martha (Director) from SAS, Stephen (Associate Director) from Law and first Anjan and then Geoff Aguirre (Associate Director) from Neurology in PSOM.

In an effort to better understand the relationship between CNS faculty and the Center, and to better serve faculty needs and interests, the we recently conducted a survey. In the summer of 2015 Martha emailed each CNS faculty member a series of questions about their engagement with the Center and invited them to answer by email or over coffee. Of the 20 faculty contacted, 15 responded, and 7 met personally with Martha. We found an encouraging level of participation: One faculty member reported simply attending occasional talks, but all other respondents reported participating in multiple substantive ways with the Center, such as teaching in programs such as Boot Camp or Fellowship programs and participating in Center-sponsored discussions. Several faculty expressed a desire for more scholarly discussion with fellow faculty. This latter desire has begun to be addressed by a visitor-led weekly discussion group on neuroscience and law, and a jointly taught Spring 2016 graduate seminar that started out as a book club.

STAFF. Thanks to Provostial support and outside grants, we have a staff that enables the broad range of Center activities outlined below. We were initially assisted by two relatively high-level administrators, first Joe Powers, PhD and then Denise Clegg, MAPP, both of whom had at least 10 yr managerial experience, and they each worked with a full-time assistant. This team, of high level staff with more basic staff support, provided invaluable organizational manpower during our period of most active growth. During this time we initiated a large number of projects, including major programs bringing several hundred participants to campus for multiple days at a time, and undertook a number of successful fund-raising ventures from federal agencies and private donors.

We are currently functioning with just one middle-level staff member, assisted by part-time undergraduates. For now this is sufficient to support our programs, which are mostly mature and running smoothly. We do anticipate another phase of growth, which will require additional staff, and this is discussed later, in the section on Education.

FELLOWS. The Center's intellectual life and outreach missions are enriched by the addition of Fellows, scientists, scholars and professionals, generally from outside of Penn, who collaborate on Center projects or educational programs on an ongoing basis. Fellows are approved by the Directors and we strive to select people who participate actively whether based in Philly or elsewhere. Several fellows from out of town have traveled to Penn to participate in CNS activities and all have contributed time and expertise to our programs. See Appendix 2 for a listing of CNS Fellows.

VISITING SCHOLARS. As the leading Center for neuroethics/neuroscience and society, we receive requests to visit from around the world. This year we are hosting two people: the eminent philosopher of mind and legal scholar, Michael Moore Moore (University Endowed Chair at the University of Illinois; Professor of Law, Professor of Philosophy, Professor in the Center for Advanced Study, and Co-Director of the Program in Law and Philosophy at the University of Illinois at Urbana-Champaign), who is visiting for the spring semester to learn more about neuroscience and is leading a weekly discussion group at the CNS, attended by

faculty and students from multiple schools, and Anna Wexler (graduate student in Science and Technology Studies at MIT) who is embedded for the year in CNS faculty member Roy Hamilton's lab, and who has already published an article on the subject in Slate.com. Although space limitations have so far prevented us from hosting many interested scholars, we recognize the value that thinkers from outside offer the Penn community and look forward to welcoming – indeed recruiting – visitors to CNS's planned home on Goddard 2. See Appendix 3 for a complete listing of CNS Visiting Scholars so far.

ADVISORY BOARD. We were somewhat amazed by the spectacular people who agreed to serve on our Board, and with the exception of Sandra Day O'Connor have met personally with each of them at least once for helpful guidance. See Appendix 4 for a listing of the CNS Advisory Board.

IV. Funding

The Center was launched with a planned 5 years of funding, of which an initial 3-year \$550,000 was set aside immediately. In view of the Center's successful beginning, a second installment of \$250,000 was given carry the Center for an additional two years. Thanks to careful spending. success with outside funders, some program-generated revenue and the Director declining her course buy-out, our latest review of the numbers indicates that well over \$100,000 still remains. (This is not counting a gift to the Center for research, which is not used for Center operations.)

External funding for meetings has been received from:

Alternatives Research and Development Foundation NINDS (NIH)

External funding for educational programs has been received from:

Cephalon
MacArthur Foundation (Law and Neuroscience Network)
NIDA (NIH), joint with the Franklin Institute
National Science Foundation
SAS Alumnus

Endowment for annual lecture from:

GVR Khodadad Foundation

Additional small donations (100-1,000) from members of the community in appreciation of our programs.

V. Space and facilities

Since its inception the CNS has shared space with the Center for Cognitive Neuroscience (CCN). Initially this arrangement was academically appropriate, as more CNS faculty come from the CCN than from any other organization on campus, and it was facilitated by the fact that Martha

was founding director of the CCN and still held that responsibility in 2009 when the CNS was formed. Although we believe the close proximity of the CNS and CCN is a huge asset to both groups, the CNS does need additional space to accommodate events, the SCAN program (see below) and visitors. Happily, we will be expanding into one of the 2nd floor pods in Goddard, which will allow space for CNS administration, CNS visitors, SCAN teaching faculty, and a lounge and study space while continuing to share a building with the CCN and remaining a 5-minute walk away from many other relevant organizations at Penn such as the Mahoney Institute of Neurological Sciences and the Dept of Medical Ethics and Health Policy.

VI. Overview of CNS programs

In keeping with our Mission Statement, we have developed and supported a thriving portfolio of research, outreach and education. These are detailed below, but in overview:

We have promoted **research** into neuroscience and society by connecting researchers with this interest across departments and schools, by increasing the neuroscience expertise of nonscientists who wish to work on the relation of neuroscience to their own fields (eg business, education, history of science) through "Neuroscience Boot Camp, by catalyzing research collaborations, and even by assisting with fund raising for research. We have also collaborated with the Hastings Center for Bioethics in a 3-yr research project on "Interpreting Neuroimages."

Our program of **outreach** is multifaceted, with programs targeting both laypersons and professionals.

Education is a growing focus, which has become more central to the CNS in recent years and is an area of planned growth.

VII. Research on Neuroscience and Society

Among the topics being examined by CNS faculty are:

- Brain enhancement
- Consumer devices for brain stimulation
- Militarization of neuroscience
- Social impact of neural predictors of Alzheimer disease
- Socioeconomic status and brain development
- The neuroscience of influence and message propagation
- The neuroscience of moral reasoning
- Neuroeconomics and neuromarketing
- Use of brain imaging in criminal trials
- Neuroscience and law more generally

The Open Access Repository (http://repository.upenn.edu/neuroethics_pubs/) gives an indication of the scope and depth of CNS faculty productivity. (Alas, not all papers can be

posted here due to variation in policy across journal publishers.) It has provided 177,146 article downloads to users around the world.

CNS faculty research is highly visible, with coverage in major media outlets. The following is a small sample from the past year:

- CNS's Anjan Chatterjee and Martha Farah weigh in on cognitive enhancement in The
 New York Times "Room for Debate:
 http://www.nytimes.com/roomfordebate/2015/04/21/using-adderall-to-get-ahead-not-to-fight-adhd
- CNS's Emily Falk explains why we sometimes stick with New Year's resolutions and sometimes don't in The Philadelphia Inquirer:
 http://www.philly.com/philly/health/Brain science that could help you ace your Ne
 w Years resolutions.html
- CNS's Roy Hamilton explains reason for both optimism and concern regarding consumer brain stimulation on **NPR**: http://www.newsworks.org/index.php/thepulse/item/76074-with-batteries-included-brain-stimulation-devices-prepare-to-go-mainstream
- CNS' Joe Kable discusses the universal tendency to discount the value of future rewards, and how this undermines our decisions about money and health in the New York Times Special Section on Your Money: http://www.nytimes.com/2015/03/26/your-money/need-financial-advice-ask-the-future-you.html?_r=0
- CNS' Daniel Langleben explains the neural bases of deception in an article on fraud in The Atlantic Monthy: http://www.theatlantic.com/magazine/archive/2016/03/the-future-of-fraud-busting/426867/
- CNS's Jonathan Moreno's perspective on military uses of neuroscience covered in The Washington Post: https://www.washingtonpost.com/news/to-your-health/wp/2015/07/28/why-darpa-is-paying-people-to-watch-alfred-hitchcock-cliffhangers/
- CNS's Adrian Raine explains the complex and ethically fraught relation between criminal behavior and the brain on NPR: http://hereandnow.wbur.org/2015/04/02/criminal-brain-research
- CNS's Tony Rostain identifies problematic attitudes concerning student performance and mental health in **The Wall Street Journal**: http://www.wsj.com/articles/mental-health-crunch-on-campus-1430082408

The Center actively encourages the exchange of ideas between faculty, a benefit to the community whether or not a research project emerges – but in some cases new research has ensued. We have arranged lunchtime discussions among small groups of faculty on the following topics: neuromarketing, political neuroscience, brain enhancement, consumer uses of noninvasive brain stimulation, regulatory status of brain-training games, poverty and brain development and moral reasoning and the brain, and selfishness in decision-making.

To date we have catalyzed several collaborations:

- Wharton's Diana Robertson and Psychology's Joe Kable are co-supervising a postdoc on the neural bases of moral reasoning in business contexts.
- Criminology's Adrian Raine, Psychology's Joe Kable and Psychiatry's Ted Brodkin are
 undertaking a joint project on the genetic and neural bases of extreme selfishness,
 which has received funding from a private donor through outreach by the CNS.
- Annenberg's Emily Falk and Psychology's Martha Farah are conducting research on socioeconomic moderation of brain-behavior relations in cognitive control and (socially relevant) driving performance.
- The lunch meeting on noninvasive brain stimulation, with Farah, Hamilton and CNS visitor Wexler grew into a biweekly discussion group, still on-going, and faculty participants are editing a special issue of Frontiers in Neuroscience on the "Ethical, Legal and Social Issues of Noninvasive Brain Stimulation."

The CNS has undertaken research collaborations with other institutions, most notably with the Hastings Center for Bioethics in a 3-year project involving Geoff Aguirre and Martha Farah from Penn and Erik Parens and Josephine Johnston from the Hastings Center called "The Uses and Misuses of Neuroimages." Though semiannual meetings, most often at Penn, the various roles of imaging in society, including medicine and law, were evaluated in terms of their ethical, legal and societal implications. The results were published as a standalone Supplement to the leading bioethics journal **The Hastings Center Report**.

VIII. Outreach (including K-12 education)

Outreach is central to the CNS mission, insofar as it raises awareness and improves understanding of the relation between neuroscience and society. We do this in a large number of ways.

ONLINE, our website serves the local community and beyond. For locals, we list relevant events at Penn such as campus talks, preceptorials relevant to neuroscience and society, and information about the Center and the SCAN program. For the world beyond Penn the website offers:

- a video library with 27 didactic lectures on neuroscience and neuroethics (Neuroethics Open Educational Resource) as well as 7 short overview lectures (Media Seminar on Neuroscience and Society) and 14 videos of colloquia (CNS Public Talk Series)
- an open access repository of writings by Penn CNS faculty that can be accessed by anyone, regardless of whether they have a subscription or library access.
- a calendar of relevant conferences world-wide, along with calls for papers and other time-sensitive information compiled by us
- resources for faculty at other institutions who want to teach neuroethics, including a
 packet of tips and suggestions and a syllabus repository where instructors can see how
 others have organized their neuroethics courses at the undergraduate and graduate
 levels
- advice for students interested in pursuing a career in neuroethics

Our website gets an average of over 200 visits per day.

We also have a Facebook page where we post occasionally on topics related to neuroscience and society. Recent examples include the Tom Stoppard play "The Hard Problem" and the FTC imposing a fine on training company Lumosity for false claims). These posts reach between 2,000 and 7,000 Facebook users each.

PUBLIC TALKS take place monthly, October – December and February – April. Speakers include eminent neuroscientists, social scientists and philosophers, as well as media stars such as David Brooks, Sally Satel and the well-known but anonymous blogger Neuroskeptic. (He spoke without a mask, but did not allow video recording!) We attract a mixed audience of students and faculty from multiple schools at Penn, other local academics from Drexel and Temple, and an assortment of retired professionals, working people and the occasional kook. We encourage discussion by allotting 20-30 mins for Q&A and then continuing discussion at a wine and cheese reception. Attendance has grown steadily over the years, from 35-50 in early years to 50-100 this year. A complete list of speakers since 2011 is given in Appendix 5.

ACADEMIC OUTREACH WITHIN PENN. The CNS functions as a catalyst for engaging diverse groups within Penn. A sample of activities aimed at stimulating thought and action in the general area of neuroscience and society includes:

• The Law and Brain Student Group, which was initiated by a law student and supported jointly by the Law School and the CNS brought 10 eminent speakers to campus for talks and meetings. It did not persist after its two first student leaders graduated. We hope to rekindle interest.

- The Communicating Neuroscience Workshop organized by the CNS brought neuroscience faculty from PSOM together for a full-day combined didactic and experiential workshop aimed at making them more effective communicators to society. Faye Flamm of the Philadelphia Inquirer spoke and CNS Fellow Sheryl Williams, a science communication specialist lectured and taught strategies. Participants were then videotaped while practicing press conference presentations and being interviewed by Daily Pennsylvanian reporters. In the days that followed, Sheryl reviewed the videos and wrote individual comments and suggestions to each participant.
- The CNS has brought together Penn students and faculty in other ways, including
 - a Brain Drinks panel discussion and blind trial of energy and calm drinks, led by CNS faculty Farah and Rostain and CNS Fellow McLellan
 - a discussion of the ethics of pediatric cognitive enhancement led by CNS faculty Rostain (which led to a session on this topic at the American Psychiatric Association the next year)
 - and a faculty reading group on the anti-psychopharm book "Anatomy of an Epidemic," including defenders and detractors of psychiatric medication on the Penn faculty, led by CNS faculty DeRubeis
 - a reading group on the implications of neuroscience for moral and legal responsibility, led by CNS visitor Michael Moore and attended by 5 faculty (3 from CNS), a SCAN graduate student and a Neuroscience Boot Camp alum.

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- We have partnered with several other groups in bringing speakers to campus, including
 - o Africana Studies
 - Bioethics
 - o the Mahoney Institute of Neurological Sciences
 - Religious Studies
 - Visual Studies
- We also collaborated with Janet Monge of the Penn Museum to have a symposium on science and race, linked to their exhibit of the Morton Skulls, called "From Skulls to Scans: How Brain Measurements Have Been Used, Misused and Misunderstood in the Study of Racial Differences." (We are scheduled to participate in another symposium on "Race and Science" at the Penn Museum next fall.)

OUTREACH BEYOND PENN. We have engaged with many groups outside of Penn. Examples of outreach to laypersons include:

• a full-day workshop for the entire high school of Episcopal Academy on the science, safety and ethics of using ADHD medications as study aids, led by CNS faculty members Farah, Morse and Rostain.

- CNS's Aguirre, Farah and Hamilton consulted with the Franklin Institute on the design of their new flagship exhibit "Your Brain," with numerous meetings at TFI and at Penn.
- CNS staff member Denise Clegg spoke annually on the science and experience of mindfulness meditation at the Philadelphia Science Festival when she was with us.
- When the Franklin Institute held a series of evening lectures on "Neuroscience and Society," CNS faculty played a major role, with four CNS faculty (Farah, Kable, Raine and Rushing) and CNS Fellow McLellan all participating.
- Farah and then staff-member Sara Strickland assisted with an after-school science and art class at the Anderson Middle School, teaching about neurons and neuronal transmission through discussion, games and pictures, the latter becoming murals on the columns at the school's entrance.

CONFERENCES:

Working with graduate students in the History and Sociology of Science department, CNS helped develop the idea of, and co-funded, a two-day meeting on the History of Neuroscience last fall called **Sorting Brains Out**. It brought together faculty and students from around the country. CNS faculty Tresch and Farah presented, along with SCAN Advisory Board member Russell Epstein and SCAN students.

CNS and the Law School co-hosted the 2013 meeting of SEAL (the Society for Evolutionary Analysis in Law, a national society which also incorporates neurolaw). Speakers included CNS faculty Morse and Farah and Visitor Dena Gromet, as well as 6 alumni of Neuroscience Boot Camp. Also in the area of neurolaw, CNS's Morse and Aguirre are active in judicial continuing education conferences, lecturing on the role of neuroscience in law.

This coming June 9-10, the Center will convene a meeting on **Animal Research Neuroethics**, including a national panel of well-known scientists and ethicists, a representative from NIH's BRAIN Initiative policy group, and several researchers from Penn. The rancor and extremism surrounding animal research has discouraged serious consideration of these issues within neuroethics, but we feel that the issues are too important to ignore. Our goal is to foster well-informed and open-minded dialog, with participants who are known to be both expert and civil. Given the divisiveness of animal research ethics, we are not publicizing this meeting.

K-12 EDUCATION:

For the past 5 years the CNS has partnered with the Franklin Institute in K-12 neuroscience education initiative, funded by a grant from NIH to co-PIs Das (TFI) and Farah (Penn). This project is summarized by the poster included as Appendix 6.

We worked with Franklin Institute experts in hands-on learning to develop the grade 9-10 minicourses. The mini-courses have engaged hundreds of local students on site at the Franklin Institute with graduate student teachers recruited from Penn by the CNS.

We took the lead on the grade 11-12 course, a full semester elective science course within the School District of Philadelphia. It has been taught for 3 years now in four Philadelphia public schools by their own science teachers: Boys Latin, Central High, Science Leadership Academy and Tacony Academy. Using the Penn-developed curriculum, it teaches neuroscience in the context of societal issues – for example neurotransmission is covered in connection with drug use, learning and development are covered in connection with education, and decision-making and moral judgment are covered in connection with crime. One student sent email to her teacher complaining that the course "has ruined my life. Let me explain-- I always thought that I knew what I wanted to do with my life-- English Education! But after studying the brain, I've become completely immersed in learning about it and want to continue studying it. I had a plan for my life that revolved around becoming an English teacher ... and I'm not sure what to do in college anymore!"

We are now in our final year of the NIH project and are preparing the course materials to be uploaded online for use by teachers everywhere.

IX. Higher Education

In addition to creating a full semester high school course, used in the Philadelphia public schools and about to be released for use nationally, the CNS has implemented several programs of higher education designed to advance our mission of "increas[ing] understanding of the impact of neuroscience on society."

NEUROSCIENCE BOOT CAMP was our first major educational program designed to enable nonscientists from a variety of fields to work knowledgably with neuroscience. For six years, from 2009-2014, we brought between 30 and 40 participants to campus for 9-10 days in August and provided an intensive program of lectures, lab visits and small group discussions designed to instill a basic understanding of the concepts, methods and findings of contemporary neuroscience that are most relevant to understanding human behavior. Appendix 7 shows the Boot Camp program.

Participants included a wide and very stimulating range of professions, with the largest number coming from law, philosophy and journalism, but also included literature professors, a novelist, an art historian, funding officers from private foundations and the military, ministers, educators, bioethicists, business people and business school professors, sociologists, an acting coach, etc! As one alumna, a diplomat with the US Department of State put it, ""A neuroscientist, a theologian, and a diplomat walk into a bar... The beginning of a joke for some but not if you're at Boot Camp! Thanks for an incredible two weeks of engaging faculty, diverse participants, and in-depth learning." Other testimonials, and an alumni newsletter, are given in Appendix 8.

Boot Camp enriched the expertise of several Penn faculty members, enabling them to extend their work more confidently into the realm of neuroscience and society: Wes Hutchinson (Wharton, who now teaches Consumer Neuroscience), Barb Mellers (Psychology/Wharton), Gal Zauberman (Wharton, who then undertook a collaboration with Joe Kable), John Tresch (HSOC, who then taught a graduate seminar in the history and sociology of neuroscience called The Life of Brain), Rebecca Ashare (Psychiatry) and Yuko Butler (GSE).

Thanks in part to funding from the MacArthur Law and Neuroscience project, we were able to offer scholarships to excellent applicants, and this allowed us to fill our classes with very bright and motivated individuals regardless of ability to pay. We also made money for several years (see Funding section) although the "profit" does not take into account the large amount of time that paid CNS staff devoted to Boot Camp.

With the end of that MacArthur program we have found it difficult to recruit a full class of participants who are both able to pay full fare and likely to benefit from, and contribute to, Boot Camp. We did not plan a 2015 Boot Camp because of the possibility that Martha might be moving to a different university then. We are currently negotiating with the Society for Neuroscience and BrainFacts.org to produce a high quality video series of lectures based on Boot Camp, taught by the original Boot Camp faculty. In this way we hope the benefits of Boot Camp can be more widely experienced.

CONTINUING MEDICAL EDUCATION was another initial focus of our educational programming, and took the form of two 2-day CME courses on "Clinical Neuroscience and Society" in 2010 and 2011. Programs are included in Appendix 9. The first year was an excellent program, very much appreciated by the 70 or so attendees. Unfortunately, even with pharmaceutical company support, this attendance did not cover our costs and we lost money. We tried one more time, drawing more heavily on local lecturers, obtaining a grant from NINDS, and doing our own CME certification (Penn's services are expensive), but we still lost money. At that point we decided not to continue. The growth of online CME has greatly reduced attendance at CME conferences.

NEUROETHICS LEARNING COLLABORATIVE. This was an NSF-funded hybrid in-class/on-line course that was designed to engage multiple universities. Working with experts at LPS, we provided (1) videotaped lectures to be viewed in class (not "flipped") at each university, followed by in-person discussion within each class, and (2) an online platform with readings and threaded discussions to enable students to interact across universities. Although this did not require simultaneous class periods across universities, it did require synchronization on a weekly basis. In 2009-2010 we partnered with Wisconsin's Neuroscience Policy PhD program, and in 2010-2011 we partnered with the London School of Economics and Duke. By then it was apparent that this novel course format was difficult to work with, despite its many theoretical advantages. Issues as mundane as differing university calendars posed serious logistic challenges. In addition, collaborating schools wanted more say in course content, not unreasonably. This could be accommodated with just one partner school, but it could not be

scaled to the level of a large network as intended. In the end we decided the drawbacks outweighed the benefits. Happily, there is a lasting product of this project, in the form of the "Neuroethics Learning Center" on our website, containing videotaped diadactic lectures of good production quality.

PENN FELLOWSHIPS IN NEUROSCIENCE AND SOCIETY. We obtained permission from NSF to divert the remainder of our Neuroethics Learning Collaborative finding to this residential summer program, which ran for two years. Its goal was to provide neuroscientists with an intensive introduction to the ethical, legal and societal implications of neuroscience. In summer of 2012 we selected top graduate students and postdocs from across the country for a week at Penn involving lectures and workshops and the preparation of a talk on neuroethics that each student could take back to their home institution to deliver. In 2013 we varied our approach by bringing neuroscience faculty to campus for a similar program, with the intention of multiplying our effect by "teaching teachers." Participating faculty pledged to teach a neuroethics course within the next three years, and in addition to lectures and workshops on neuroethics, also engaged in a half-day session on teaching neuroethics led by Bruce Lenthall, Director of Penn's Center for Teaching and Learning. The program for the 2012 and 2013 Fellowships are included in Appendix 10. By 2015, at least 6 new neuroethics classes have in fact been taught by the faculty who attended, at the Universities of Porto, Tubingen, Zagreb, UCLA, Columbia and Vassar.

NEW COURSES. In addition to teaching in the area of neuroscience and society already bring contributed by CNS faculty, the CNS was instrumental in adding several new courses to Penn's rosters. Boot Camp enabled Wharton marketing professor Wes Hutchinson to offer "Consumer Neuroscience" this year, as an undergraduate course and as a separate MBA course in Wharton. At the graduate level, CNS faculty and Boot Camp alum John Tresch taught a 900-level course on history and sociology of neuroscience called "the Life of Brain." CNS faculty Morse and Amy Wax taught the new course, "Law and Neuroscience," in the Law School, and CNS faculty Martha and Tony Rostain are currently teaching a 700-level course called "Brain Development and Society." These courses were actively encouraged by the CNS, and added to the existing courses offered by CNS faculty, including Jonathan Moreno's 600-level graduate course on "Neuroethics," as well as the first ever Coursera course on the same topic, Susan Rushing's 300-level "Neurolaw," taught in Criminology, and Martha's 200-level "Neuroscience and Society" and 400-level "Neuroethics" courses. Unfortunately, because their teaching efforts have been required elsewhere, it is not clear that the courses just mentioned by Moreno, Rushing and Farah will be continued.

PRECEPTORIALS are short, generally 1-meeting noncredit courses typically taught by Penn faculty, that Penn students organize and attend. Each year the CNS reaches out to its own faculty and to other Penn faculty to encourage teaching preceptorials on topics related to neuroscience and society. This has resulted in a large number and variety of such preceptorials, including the following (those taught by CNS faculty or fellows are starred).

Meditation and the Brain: Science and Experience*

- Antidepressants and Society*
- Music and the Brain: Part 1
- Music and the Brain: Part 2
- The Singularity: What if computers achieve superhuman intelligence?
- Rebuilt: How Becoming Part Computer Made Me More Human*
- A Boxing Brain
- A Spoonful of Delicious Neuroeconomics*
- Can You Do the Brain Wave?
- The Biology of Beauty*
- Are Six Hours Really Enough? The Effects of Sleep Deprivation on Cognitive Performance and Health
- Is Adderall a Cognitive Enhancer?*
- Mind Wars: Neuroscience and Society*
- Neuroscience in the Courtroom*
- Brainwashing, Insanity, and Duress: Excuse Defenses to Criminal Liability
- The Neuroscience of Making a Decision*

GRADUATE CERTIFICATE IN SOCIAL, COGNITIVE AND AFFECTIVE NEUROSCIENCE (SCAN).

The SCAN Certificate is the biggest CNS initiative of the last few years. It reflects a decision to deepen the CNS's relationship with the core academic mission of the University.

The Center put forward the idea of SCAN in 2012, when many of our research and outreach programs had taken shape and things were running smoothly. We had asked: Is our development complete? Do we want more of the same, or do we want to grow in a different direction? Our answer was: Grow as an *academic* program, not merely stimulating and informing people within an academic context, but helping to shape to the actual academic opportunities available to Penn students. By working with the then graduate dean of SAS, Ralph Rosen, we developed and had approved a 4-course graduate certificate.

SCAN's immediate goal is to equip graduate and professional students at Penn, across a range of disciplines, to work knowledgeably and productively with neuroscience. Its ultimate goal is to improve the quality of cross-disciplinary scholarship and practice in the "neuro-fields" globally, by sending Penn PhDs, JDs, and other graduate alumni into the world prepared for exemplary work and leadership roles in the application of neuroscience to diverse fields. As far as we know, the SCAN Certificate Program it is unique in the world.

After admitting its first class in 2013, with a class size of 12 greatly exceeding the projections used in the SAS proposal (2-3), we have continued attracting excellent and diverse classes. There are now 31 students enrolled or already graduated. This year one of our students transferred from Georgetown Law School to Penn specifically to be able to enroll in SCAN!

Enrollment is shown in the figure. In the three years of SCAN's existence we have served students from 6 of Penn's schools (ASC, GSE, Law, Nursing, PSOM, SAS) and 10 departments.

The two SCAN core courses have evolved each year, in an effort to meet the needs of this unusual set of students as well as possible. We are still fine-tuning. It has been challenging to find suitable elective courses for all of the SCAN students (but this will be addressed by the hiring plan described next). Many students find the program challenging, but engagement and esprit de corps are high. Appendix 11 is the information packet we provide to prospective students, which describes the program goals and requirements in more detail.

We are currently recruiting a neuroscientist to a modified Lecturer A position, funded through SAS, with shared responsibilities to the College and to SCAN. The person will teach 1 and 1 for a big Psych or BBB undergrad lecture course, plus 1 and 1 small courses at the 400 level, suitable for undergrads and also serving the electives needs of graduate SCAN students. Finally, this person will devote one third time as Associate Director of Educational Programs for the CNS, managing the SCAN program, helping to advise its students, and devising new activities and programs to enrich the education of SCAN students and Penn graduate and undergraduate students more generally.

X. Conclusions and challenges for the future

Given the length of this report, we will resist the urge to add a summary here! Instead we will offer some general observations about how we have been able to advance our mission, and comment on the challenges now facing us.

The Center has benefitted from generous financial support from Penn. To the extent that we have been able to attract additional money from federal agencies, foundations and individuals, this has been possible only because of the staff support and demonstration programs made possible by Penn's investment in us.

The other essential ingredient of our Center's success is the spectacular faculty, with diverse perspectives on neuroscience and society, who have been generous with their time. Penn was an easy place to establish the world's leading Center because of all the faculty talent and goodwill. We look forward to growing the faculty in the coming months, inviting new colleagues to join with us.

Regarding challenges: Unlike most centers and programs, we do no longer have "space" on our list of challenges! With the planned new space in Goddard Labs, we look forward to hosting visiting scholars who will enrich the Penn environment and to mounting new educational activities that will benefit SCAN students as well as Penn's graduate and undergraduate students more generally. However, the other commonly listed challenge does still apply to the CNS: fund-raising.

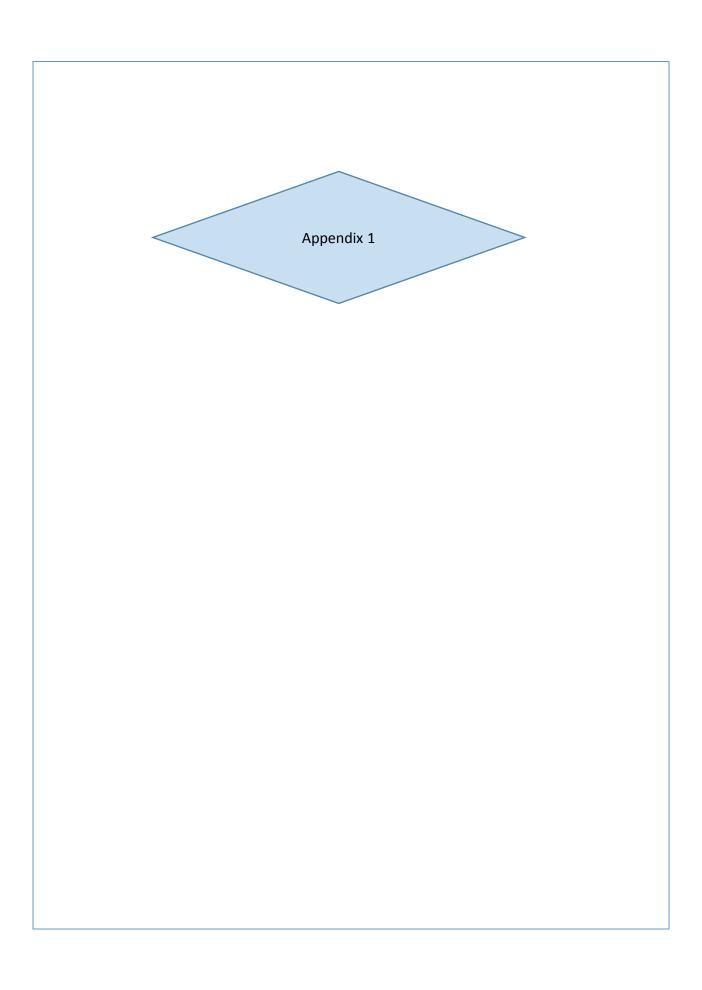
We believe that our programs would be attractive to major donors, but it has been difficult to connect. Indeed, our most generous donor, who has so far given \$100,000 to endow a lecture series and \$200,000 to support research, was not told about the Center when he first approached Penn's central development office, and was connected to us only after deciding to give his major gift to another university. Of course every Center wants to head Development's giving priorities list! Our concern is that we may not be getting matched with donors who would really like to support us, based on the experience just mentioned as well as others.

The SCAN program, while based in SAS, serves the whole university and would also be worthy of support from Development. It is a unique interdisciplinary educational program that attracts graduate students to Penn over other universities, but it is unlikely ever to be profitable in purely monetary terms. (We have received some donor support through SAS, for which we are extremely grateful.)

Next section:

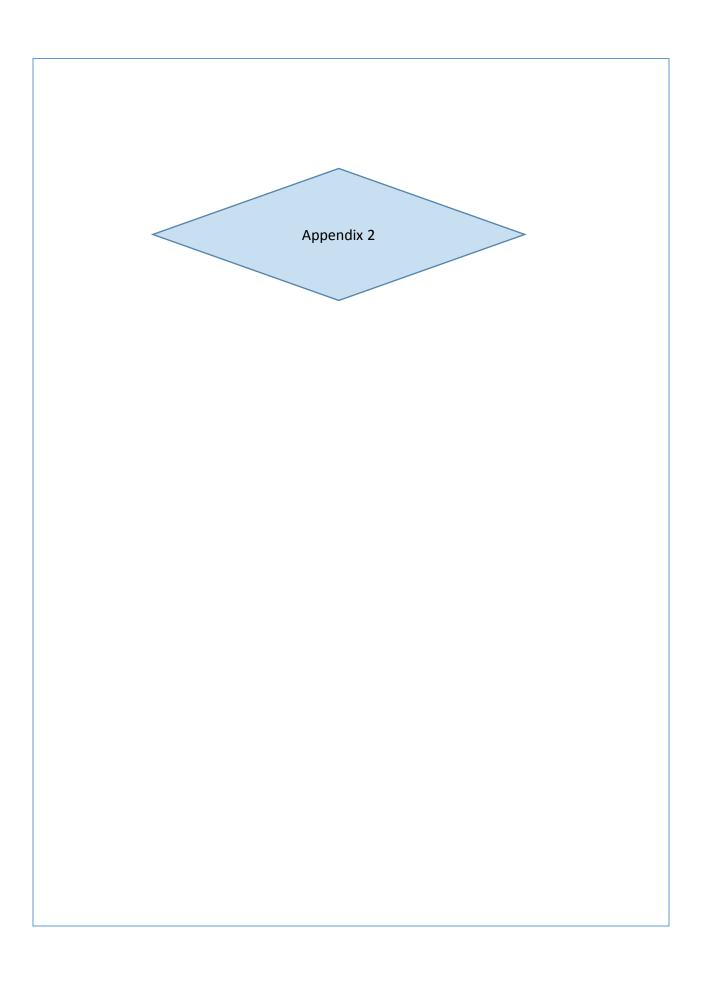
Appendices

- 1. CNS Faculty
- 2. CNS Fellows
- 3. CNS Visiting Scholars
- 4. CNS Advisory Board
- 5. CNS Public talks series, 2011-2016
- 6. NIH project with TFI
- 7. Neuroscience Boot Camp sample program
- 8. Boot Camp testimonials and newsletter
- 9. CME programs (2)
- 10. Fellowships in Neuroscience and Society, two programs
- 11. SCAN information packet



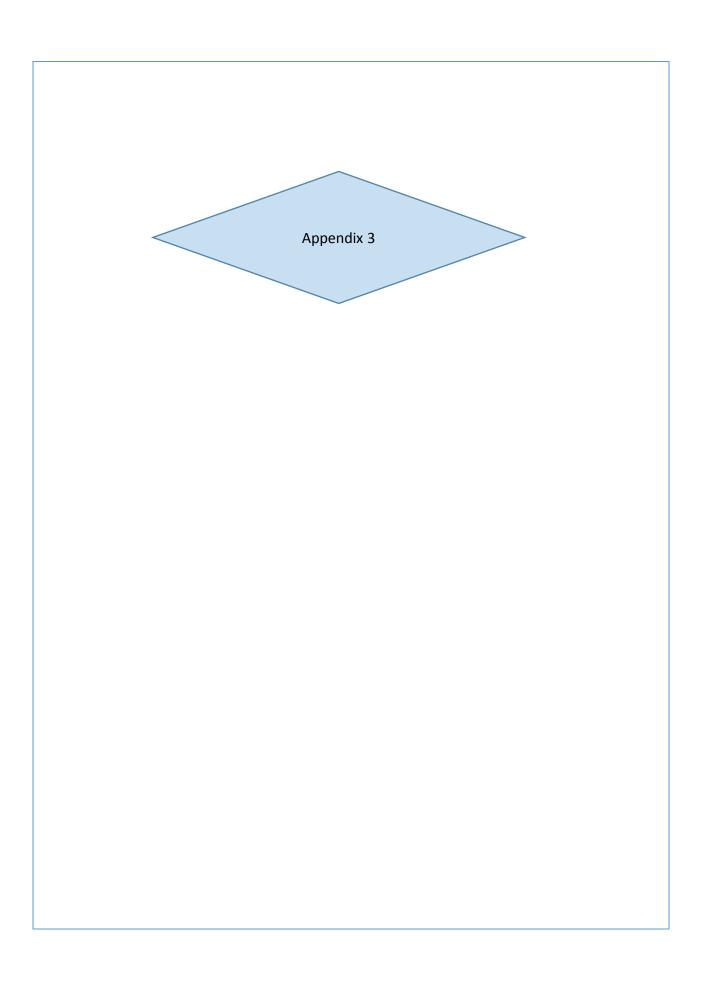
CNS Faculty

- Geoffrey K. Aguirre, Associate Professor of Neurology
- Anjan Chatterjee, Professor of Neurology
- Robert J. DeRubeis, Samuel H. Preston Term Professor in the Social Sciences and Chair of the Department of Psychology
- Martha J. Farah, Walter H. Annenberg Professor of Natural Sciences
- Emily B. Falk, Associate Professor, Annenberg School of Communication
- Kenneth R. Foster, Professor of Bioengineering and Associate Professor of Electrical and Systems Engineering
- Geoff Goodwin, Assistant Professor of Psychology
- Roy Hamilton, Assistant Professor of Neurology
- Joseph Kable, Baird Term Associate Professor of Psychology
- Jason Karlawish, Professor of Medicine and Medical Ethics
- Daniel Langleben, Associate Professor of Psychiatry
- Jonathan D. Moreno, David and Lyn Silfen University Professor and Professor of Biomedical Ethics and History and Sociology of Science
- Stephen J. Morse, Ferdinand Wakeman Hubbell Professor of Law; Professor of Psychology and Law in Psychiatry
- Adrian Raine, Richard Perry University Professor; Departments of Criminology,
 Psychiatry, and Psychology
- Diana Robertson, Joseph Kolodny Professor of Social Responsibility in Business;
 Professor of Legal Studies and Business Ethics
- Anthony Rostain. Professor of Psychiatry at the Hospital of the University of Pennsylvania and the Children's Hospital of Philadelphia
- Susan E. Rushing, Assistant Professor of Psychiatry
- Robert L. Sadoff, Clinical Professor of Forensic Psychiatry and Director, Forensic
 Psychiatry Fellowship Program at the University of Pennsylvania School of Medicine
- John Tresch, Assistant Professor of History and Sociology of Science
- Amy Wax, Robert Mundheim Professor of Law
- Deena Weisberg, Senior Fellow, Department of Psychology



CNS Fellows

Sheri Alpert, PhD, Associate Editor, *Neuroethics*Michael Chorost, PhD, Award-winning author and thechnology theorist
Denise Clegg, MAPP, Deputy Executive Director, Garrison Institute
Glenna Crooks, PhD, President, Strategic Health Policy International
Jayatri Das, PhD, Chief Bioscientist, The Franklin Institute Science Museum
Seth Gillihan, PhD, Visiting Assistant Professor of Psychology at Haverford College.
Ruth Greenberg, JD, Adjunct Professor, Boston University School of Medicine
Zack Lynch, Executive Director, Neurotechnology Industry Organization
A. Thomas McLellan, PhD, Chief Executive Officer, Treatment Research Institute
Erik Parens, PhD, Senior Research Scholar at The Hastings Center
Sheryl Williams, Secretary, Board of Directors, Healthcare Businesswomen's Association
Rachel Wurzman, PhD, Post-doctoral Research Fellow, Laboratory for Cognition and Neural
Stimulation, University of Pennsylvania



CNS Visiting Scholars

Farah Focquaert, PhD, Research Fellow, Bioethics Institute Ghent, Ghent University

Dena Gromet, PhD, Research Director, The Wharton School of the University of Pennsylvania

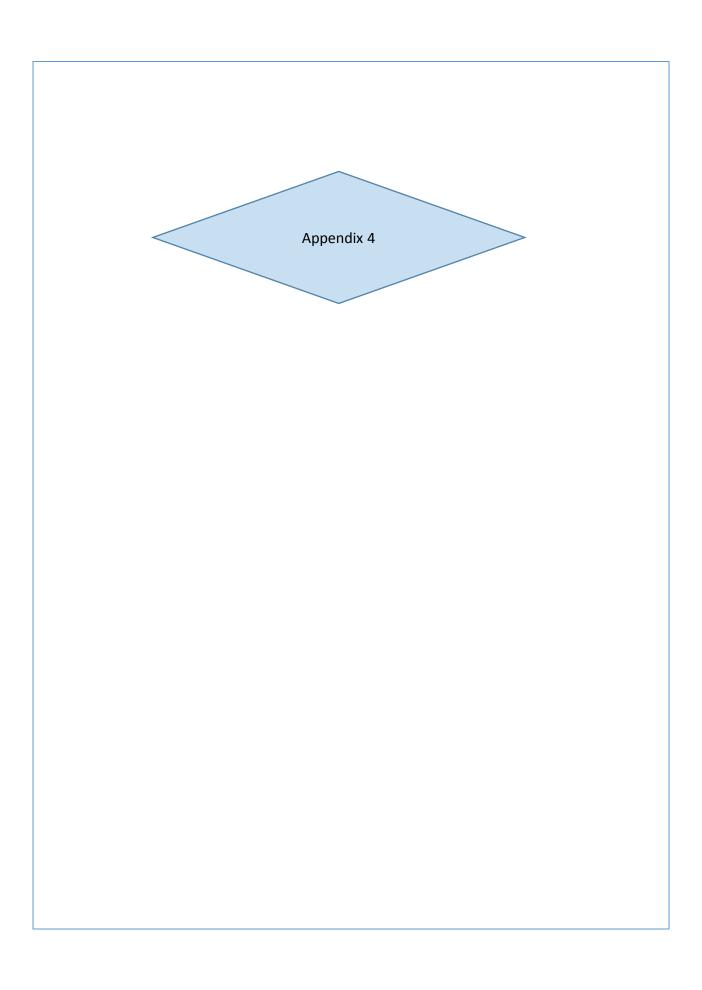
Michael S. Moore, Charles R. Walgreen, Jr. Chair, Co-Director, Program in Law and Philosophy, University of Illinois at Urbana-Champaign

Barbara J. Sahakian, PhD, Distinguished Visiting Professor 2009, Professor of Clinical Neuropsychology at the Department of Psychiatry and Medical Research Council (MRC)/Wellcome Trust Behavioural and Clinical Neuroscience Institute, University of Cambridge

Adam Shriver, PhD, Medical Ethics and Health Policy at the University of Pennsylvania

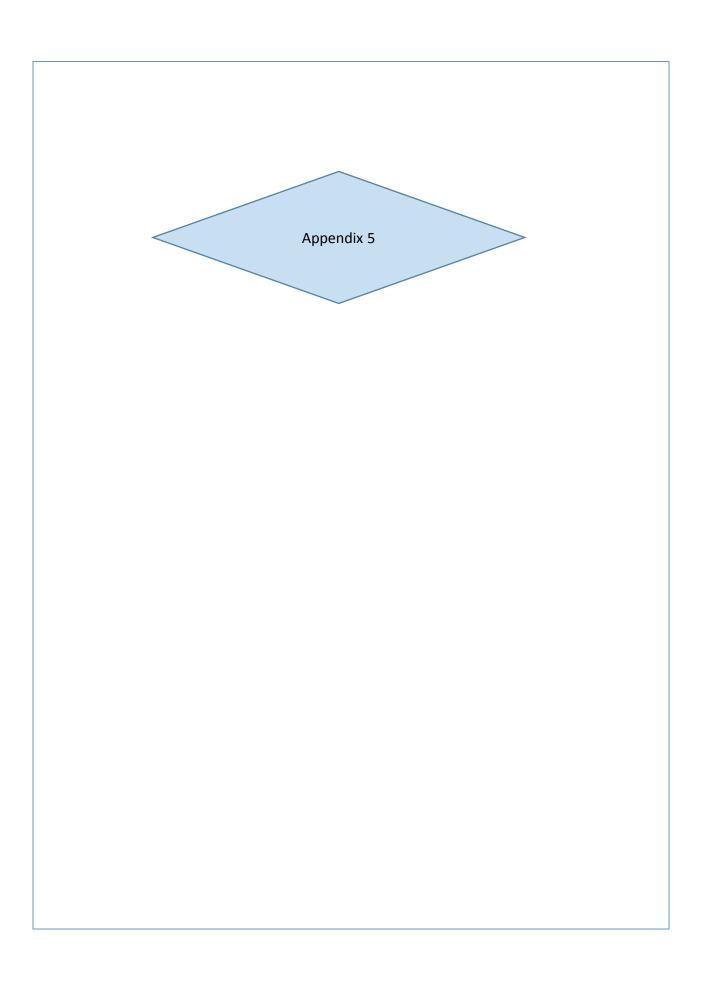
Scott Vrecko, PhD, Lecturer and Programme Director of the MSc Programme in Medicine, Science and Society, King's College London

Anna Wexler, PhD candidate in the Department of Science, Technology and Society at the Massachusetts Institute of Technology (MIT)



CNS Advisory Board

- **David Brooks** is an Op-Ed columnist with *The New York Times* and a commentator on politics and popular culture for a wide range of print and broadcast media.
- **Philip Campbell, PhD** is the Editor-in-Chief of Nature and the Editor-in-Chief of Nature publications.
- **Howard Gardner, PhD** is the John H. and Elisabeth A. Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education.
- Sanjay Gupta, MD, is chief medical correspondent for the health and medical unit at CNN.
- **James J. Heckman, PhD** is the Henry Schultz Distinguished Service Professor of Economics at The University of Chicago.
- **Steven E. Hyman, MD** is Provost of Harvard University and Professor of Neurobiology at Harvard Medical School.
- **Jonah Lehrer** is Contributing Editor at *Wired*, *Scientific American Mind* and National Public Radio's Radio Lab.
- **Alan Leshner, PhD** is Chief Executive Officer of the American Association for the Advancement of Science and Executive Publisher of the journal *Science*.
- Sandra Day O'Connor was the first woman appointed to the Supreme Court of the United States.





2011 - 2012

The Public Talk Series is open to the University and external community. Unless otherwise noted, all lectures will be held on Thursday, from 4:30-6:00 pm at Penn Law's campus (3400 Chestnut St.) Check our website for updates at www.neuroethics.upenn.edu

Due to limited seating, please RSVP to: info@neuroethics.upenn.edu

Oct 6 - Charles A. Nelson, PhD

Professor of Pediatrics and Neuroscience, Harvard Medical School and Richard David Scott Chair in Pediatric Developmental Medicine Research, Children's Hospital Boston Location: Golkin Room, Houston Hall (3417 Spruce St.)

The Effects of Early Psychosocial Adversity on Brain and Behavioral Development

Nov 3 - Michael L. Sachs, PhD

Professor, Interim Chair, Department of Kinesiology, Temple University Location: Room 245A, Silverman Hall (3400 Chestnut St.)

Head Injury in Athletes: When Sports and Public Health Collide

Dec 1 – Robert Whitaker

Author and Science Writer

Location: Room 245A, Silverman Hall (3400 Chestnut St.)

Rethinking Psychiatric Care: History, Science, and the Long-Term Effects of Psychotropic Medications

Feb 2 – David F. Dinges, PhD

Professor of Psychology in Psychiatry, Chief of the Division of Sleep and Chronobiology, Department of Psychiatry, and Center for Sleep and Circadian Neurobiology, Perelman School of Medicine, University of Pennsylvania.

Location: Room 240B, Silverman Hall (3400 Chestnut St.)

No Time to Sleep: Neurobehavioral and Societal Consequences of Sleep Loss from Life Style

Mar 1 – Steven E. Hyman, MD

Provost of Harvard University and Professor of Neurobiology, Harvard Medical School Location: Room 240B, Silverman Hall (3400 Chestnut St.)

Psychopharmacology and the Developing Brain: From Neuroscience to Societal Implications

Apr 5 – John Cacioppo, PhD

Tiffany & Margaret Blake Distinguished Service Professor, University of Chicago and Director, Center for Cognitive and Social Neuroscience

Location: Ben Franklin Room, Houston Hall (3417 Spruce St.)

The Hazards of Social Isolation

May 3 - Larry J. Young, PhD

William P. Timmie Professor, Department of Psychiatry and Division Chief, Behavioral Neuroscience and Psychiatric Disorders, Emory School of Medicine Location: Room 240B, Silverman Hall (3400 Chestnut St.)

Neurobiology Biology of Social Bonding: Implications for Autism and Society

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October 4 Special Symposium: From Skulls to Scans: How Brain Measurements Have Been Used, Misused and Misunderstood in the Study of Racial Differences

Janet Monge, Department of Anthropology, University of Pennsylvania and Curator, Penn Museum

Geoffrey Aguirre, Department of Neurology, University of Pennsylvania

Dorothy Roberts, Law School and Department of Sociology, University of Pennsylvania

Location: Neville Classroom, Penn Museum (3260 South St.)

You are invited to arrive at 4:00 p.m. to view the Morton Skull Collection.

October 24 First Annual GVR Khodadad Endowed Lecture

(Wednesday) Prosocial Primates: Selfish and Unselfish Motives

Frans de Waal, Department of Psychology, Emory University and Yerkes National

Primate Research Center

Location: Bodek Lounge, Houston Hall (3417 Spruce St.)

November 1 Do Politics Shape the Perception of Race? Evidence from the Brain and Behavior

David Amodio, Department of Psychology, New York University

Location: Room 214, Gittis Hall (3400 Chestnut St.)

December 6 Brain Rumors: Public (Mis) understanding of Neuroscience and Why It Matters

Neuroskeptic

Location: Room 214, Gittis Hall (3400 Chestnut St.)

February 7 Magic or Tragic? The Use of Animals in Research

Colin Blakemore, Department of Physiology, University of Oxford

Location: TBD

March 7 Brain Training: Current Challenges and Potential Resolutions

Susanne Jaeggi, Department of Psychology, University of Maryland

Location: TBD

April 4 Health Inequalities in Society as a Problem for Neuroscience

Peter Gianaros, Department of Psychology, University of Pittsburgh

Location: TBD





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October 3 Unlearning the Lessons of History, Science and Common Wisdom: The DSM-5 and Major Depression

Allan Horwitz, PhD, Department of Sociology, Rutgers University Location: Room 240B, Silverman Hall, 3400 Chestnut St.

November 21 Politics, Prejudice, and the Brain: Social Influences on Face Perception

David Amodio, PhD, Department of Psychology, New York University

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

December 5 2nd Annual GVR Khodadad Endowed Lecture

Intergroup Conflict and Conciliation: Insights from Psychology and

Neuroscience

Rebecca Saxe, PhD, Department of Brain and Cognitive Sciences, MIT

Location: Widener Hall, Penn Museum, 3260 South St.

Spring Book Conversation Series

February 6 Anjan Chatterjee, MD, Professor of Neurology, Penn Center for Neuroscience &

Society member and author of the recently published **The Aesthetic Brain: How We Evolved to Desire Beauty and Enjoy Art** in conversation with **Blake Gopnik, PhD,** Art Critic for the Huffington Post and previously the Washington

Post and Newsweek.

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

March 6 Carl Hart, PhD Columbia University and author of the recently published High

Price: A Neuroscientist's Journey of Self-Discovery That Challenges Everything You Know About Drugs and Society in conversation with A.

Thomas McLellan, PhD, Director, Treatment Research Institute

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

April 3 Paul Offit, MD, Children's Hospital of Philadelphia and author of the recently

published **Do You Believe in Magic? The Sense and Nonsense of Alternative Medicine** in conversation with **Emmeline Edwards, PhD**, Director, Extramural Research, National Center for Complementary and Alternative Medicine, NIH

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

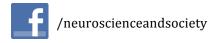
May 1 Sally Satel, MD, American Enterprise Institute and author of the recently

published **Brainwashed: The Seductive Allure of Mindless Neuroscience** in conversation with **Geoffrey Aguirre, MD, PhD,** Department of Neurology,

University of Pennsylvania

Location: Room 240B, Silverman Hall, 3400 Chestnut St.





The 2014-2015 Public Talk Series is open to the University and external community. Visit neuroethics.upenn.edu for additional information. Unless otherwise noted, all lectures will be held from 4:30-6:00 p.m. Due to limited seating, please rsvp to: info@neuroethics.upenn.edu.

October 2 The Neuroscience of Enhancement: A Framework for Ethical Analysis

William Casebeer, PhD, Defense Advanced Research Projects Agency (DARPA)

Location: Room 2, Gittis Hall, 3400 Chestnut St.

November 6 Mechanical Brains and Responsible Choices

Michael Moore, JD, College of Law Program in Law and Philosophy,

University of Illinois Urbana-Champaign

Location: Room 240A, Silverman Hall, 3400 Chestnut St.

November 13 Brains on Show: Neuroscience in the Visual Arts

Hugo Spiers, PhD, Department of Psychology, University College London

This event presented in collaboration with Penn Visual Studies Location: Room 240A, Silverman Hall, 3400 Chestnut St.

December 4 3rd Annual GVR Khodadad Endowed Lecture: A Specialized Subtype of

Serotonergic Neuron Shapes Social Behavior in Mice

Susan Dymecki, MD, PhD, Department of Genetics, Harvard Medical School

Location: Room 240A, Silverman Hall, 3400 Chestnut St.

February 5 Brain Development and Public Policy: Translating What We Discover Into

What They Do

Pat Levitt, PhD, Institute for the Developing Mind,

Children's Hospital Los Angeles

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

March 5 Controlling Brain Plasticity

Takao Hensch, PhD, Center for Brain Science, Harvard University

Location: Room 240B, Silverman Hall, 3400 Chestnut St.

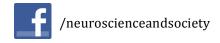
April 2 The Brains Behind Morality

Patricia Churchland, D.Litt, B.Phil, LLD, Department of Philosophy,

University of California, San Diego

Location: Room 240B, Silverman Hall, 3400 Chestnut St.





The **2015-2016** CNS Talk Series features speakers from the Penn community! Lectures run 4:30-5:30 followed by discussion and a reception. *Limited seating, please rsvp to: info@neuroethics.upenn.edu.*

Oct. 1 Cognitive Enhancement with Noninvasive Brain Stimulation: Better Living Through Electricity?

Roy H. Hamilton, MD, Penn Department of Neurology Location: Room 245A, Silverman Hall, 3501 Sansom Street

Nov. 5 From Do-It-Yourself to Direct-to-Consumer: the Regulation of Consumer Noninvasive Brain Stimulation Devices

Anna Wexler, Visiting Fellow, Penn Center for Neuroscience & Society and MIT Department of Science, Technology and Society Location: Room 240A, Silverman Hall, 3501 Sansom Street

Dec. 3 4th Annual GVR Khodadad Lecture: The Neuroscience of Selfishness: Psychopathy as an Initial Model Adrian Raine, D.Phil., Penn Department of Criminology Location: Room 240A, Silverman Hall, 3501 Sansom Street

Feb. 4 Childhood Poverty and Brain Development: From Science to Policy

Martha J. Farah, PhD, Penn Department of Psychology Location: Room 245A, Silverman Hall, 3501 Sansom Street

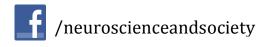
Mar. 3 Neuroimaging in the Courtroom: a Perspective From the Witness Stand

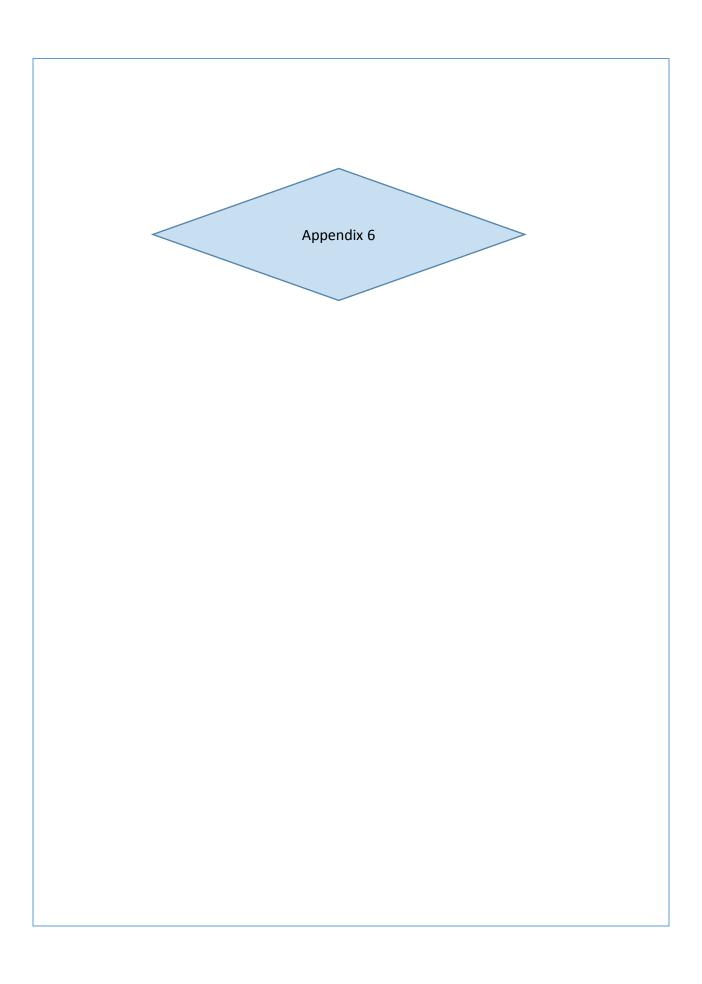
Geoffrey K. Aguirre, MD, PhD, Penn Department of Neurology Location: Room 2, Gittis Hall, 3501 Sansom Street

Apr. 7 Inevitable Mens Rea and Legal Insanity in the Age of Neuroscience

Stephen J. Morse, JD, PhD, Penn Law School Location: Room 2, Gittis Hall, 3501 Sansom Street









Dr. Steve Snyder, The Franklin Institute
Project Pls: Dr. Martha Farah, University of Pennsylvania Center for Neuroscience & Society



K-4 Students | Museum visit exhibit exploration: Neuroscience in you. The core element of programming for this group will be self-guided exploration of an exhibition at The Franklin Institute entitled *Your Brain*. Exhibit interactives demonstrate functions of the brain

at the levels of neurons, functional pathways, and real life applications.



5-8 Students | Themed museum experience: Neuroscience in your school. A themed museum experiential package will be created to augment the exhibition and allow students to explore the brain in the context of school. Students will investigate areas of neuroscience related to reading, learning, and cognition through a hands-on workshop, supporting film, and exhibit exploration.



9-10 Students | Museum mini-course: Neuroscience in your social network. For grades 9-10, a seven-week mini-course will be created that focuses on the neuroscience of emotion, communication, self-control, and other topics relevant to the social aspects of adolescence.

Project Description

From sensing to moving to thinking to feeling, neuroscience explains how we perceive and interact with the world around us. Yet this important topic of intense personal relevance remains largely unaddressed in the K-12 science education curriculum. Through the "Neuroscience in Your World" project, The Franklin Institute and the Center for Neuroscience & Society at the University of Pennsylvania will create a suite of programs to inspire excitement for and increase knowledge of neuroscience, impacting K-12 students and teachers in both the Philadelphia region and communities worldwide.

ence	K-4 Students and Teachers	Museum visit exhibit exploration	Neuroscience in you		
of Audience	5-8 Students and Teachers	Themed museum experience	Neuroscience in your school	tent	
Breadth	9-10 Students and Teachers	Museum mini-course	Neuroscience in your social network	h of Content	
	11-12 Students and Teachers	School elective course	Neuroscience in society	Depth	

Overview of the audiences, formats, and contexts of social relevance for the continuum of programs to be created through the proposed work. As students progress from K-12, the breadth of audience becomes more focused, while scientific content and social context become more complex. Proposed teacher professional development follows the same trend.

Project component			Year 3 Sept 2013-Aug 2014	Year 4 Sept 2014-Aug 2015	Year 5 Sept 2015-Aug 2016
		Exhibit components finalized January 2013	Exhibit opens: soft opening April 2014, public opening June 2014		
K-4/5-8		Curriculum development	Curriculum delivery Formative evaluation Develop summative instrument	Curriculum delivery Summative evaluation	Curriculum delivery
K-8 PD	• PD training	PD development	PD delivery Formative evaluation Develop summative instrument	PD delivery Summative evaluation	• PD delivery
9-10	Curriculum + PD development	Curriculum + PD development	Curriculum + PD delivery Formative evaluation Develop summative instrument	Curriculum + PD delivery Curriculum + PD summative evaluation	Curriculum + PD delivery
11-12	Curriculum + PD development PD delivery	Pilot curriculum delivery Formative evaluation PD delivery	Curriculum + PD delivery Develop summative instrument	Curriculum + PD delivery Curriculum + PD summative evaluation	Curriculum + PD delivery

Timeline of development, delivery, and dissemination of project elements including program curricula for grades K-12, teacher professional development (PD) materials, and exhibit multimedia adapted for online distribution.

11-12 Students | School Elective Course:
Neuroscience in society. Through a semesterlong elective course, students will learn about neuroscience in the context of its relevance to a variety of societal institutions including law, politics, economics, the military, and the use and misuse of neuroscience in the social dialogue about these issues.

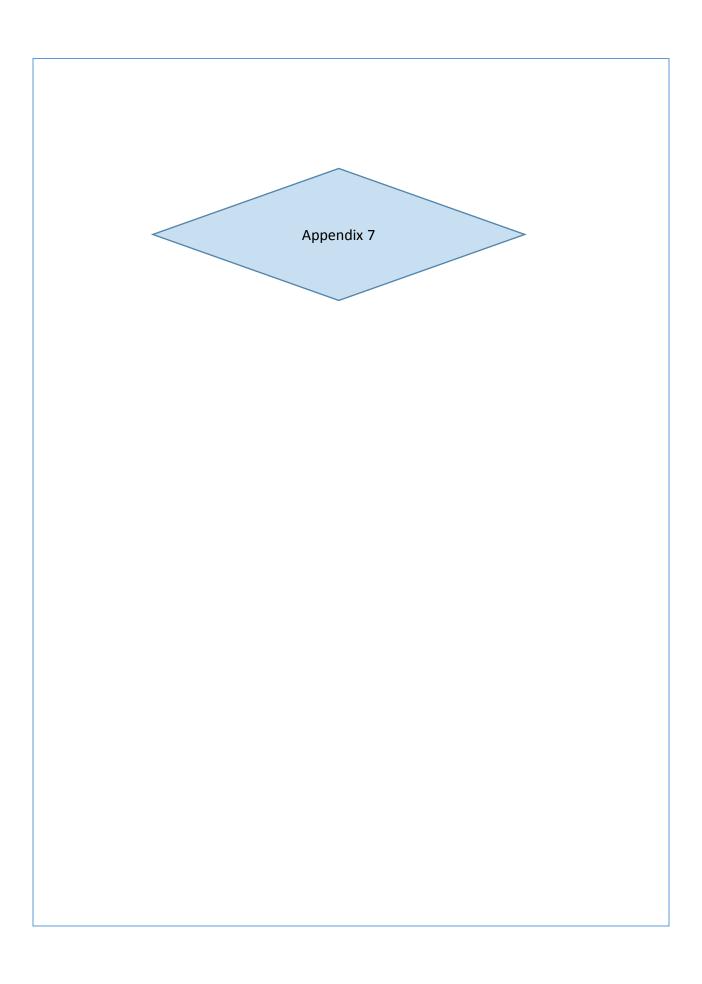
NIH Blueprint for Neuroscience Rese



Professional Development: Supporting student programming, professional development (PD) modules will also be developed for teachers at all levels. Content and format of these modules will be matched to each type of programming, ranging from short, one-session courses at The Franklin Institute complementing the exhibit experience, to be adapted for use elsewhere and incorporated into the Digital Toolkit, to an in-depth university-based summer workshop, Penn's Neuroscience Boot Camp.



This project was supported by the National Center for Research Resources and the Division of Program Coordination, Planning, and Strategic Initiatives of the National Institutes of Health and administered by the National Institute on Drug Abuse through Grant Number R25DA033023.



6TH ANNUAL NEUROSCIENCE BOOT CAMP

UNIVERSITY OF PENNSYLVANIA JULY 28TH-AUGUST 6TH, 2014



FROM THE DIRECTOR

July 28, 2014

Dear Participants,

Atten-hut! And welcome to Neuroscience Boot Camp!

My colleagues and I are thrilled to have such an accomplished group of Boot Camp students, and we look forward to working with you over the next ten days.

Boot Camp has been made possible by the generous support of others. Our sincere thanks go to:

- The Office of the Provost, University of Pennsylvania
- The Institute for Research in Cognitive Science, University of Pennsylvania
- The Franklin Institute
- · An anonymous Boot Camp alumnus

Sincerely,

Martha J. Farah, PhD

Director, Center for Neuroscience & Society

Maka Farah

Pine St.	Spruce St.	Locust St.	Walnut St.	Sansom St. Hi	Chestnut St.	
				St. Hilton Homewood Suites		41st St.
Vet School		Locust Walk		Suites		15 410†
						39th St.
Lejdy Goddard Labs Labs			Huntsman Hall			38th St.
Hamilton Walk	The Quadrangle		an		37th St.	
			The Button			36th St.
Pennsylvania	Hospital of the	Houston Hall	con	IRCS		
						34th St.
	Penn Museum	Franklin Field (Stadium)		Singh Ctr. for Nanotechnology		33rd St.

BOOT CAMP NOTES

Unless otherwise noted, classes will take place at the Institute for Research in Cognitive Science (IRCS), which is in suite 400A of 3401 Walnut St, A-Wing. The entrance is on the corner of 34th and Walnut Sts., next to Starbucks. IRCS is a 10-15 minute walk from the hotel. The hotel, Hilton Homewood Suites, will run a shuttle to IRCS every morning at 8:30 AM, but seating is limited to nine seats and is first come, first serve. Seats on the shuttle may be reserved at the concierge desk.

PBULIC TRANSPORTATION

Downtown Philadelphia is easily accessible via the #21 bus, which runs down Chestnut St., or any eastbound trolley departing from either of the stations marked on the map. Fare is \$2.25 cash per ride, or one token (\$1.80). Please visit the SEPTA website (septa.org) for more information on where to purchase tokens and for transit schedules and maps.

MEALS

For those staying in the hotel, full breakfast is available each morning from 7-9am. There will also be a few light continental breakfast items available on site at IRCS each morning.

There will be coffee available throughout the day, and snacks in the afternoon.

Lunch vouchers are for use at Houston Market in Houston Hall only. Treat them like cash; they are not replaceable if lost.

FIELD TRIP GROUPS

Because many of the labs you will be visiting during Boot Camp are fairly small, you have been split into two groups, Group A and Group B. Please take note of where your group is during each field trip.

Group A

Last name from Austin - Langione

Group B

Last name from Lee - Youngberg

CONTACT INFORMATION

For any bootcamp-related questions, feel free to contact Sue Yee Chen at (215) 573-7004 (office) or (917) 595-9385 (cell). In the event of a medical emergency, please call 911.

Monday 4:30-6:00pm Welcome Reception (Houston Hall, Golkin Room, July 28th 3417 Spruce St.)

Tuesday
July 29th
9:00-10:00am Introductions; Overview of Boot Camp (M. Farah)
10:00-10:15am Break
10:15-12:15pm Neuroscience Overview: History &
Introduction to the Human Brain (M. Farah)
12:15-1:15pm Lunch

CELLULAR NEUROSCIENCE AND NEUROCHEMISTRY I

1:15-2:30pm Cellular Neuroscience (M. Kaplan) 2:30-2:45pm Break

2:45-3:45pm Basic Neurochemistry (M. Kaplan)
3:45-5:00pm Neuropharmacology (M. Kaplan)

Wednesday July 30th

9:00-9:45am Announcements

CELLULAR NEUROSCIENCE AND NEUROCHEMISTRY II

9:45-10:45am Breakout Session: Topics in Neurochemistry and

Psychopharmaceuticals

GROUP A SCHEDULE

10:45-11:00am Walk to Leidy Labs from IRCS

11:00-11:30am Field Trip: Recording from Single Neurons

(M. Kaplan)

11:30-12:00pm Break/Leave Early for Lunch

GROUP B SCHEDULE

10:45-11:15am Break

11:15-11:30am Walk to Leidy Labs

11:30-12:00pm Field Trip: Recording from Single Neurons

(M.Kaplan)

12:00-1:30pm Lunch

IMAGING I

1:30-2:30pm History, Physical Principles, Overview of Types of

Imaging (G. Aguirre)

2:30-2:45pm Break

2:45-3:45pm Basic fMRI: Safety, Design, Data Analysis

(G. Aguirre)

3:45-4:45pm Advanced fMRI: Part I (G. Aguirre)

Thursday July 31st **IMAGING II**

9:00-10:15am Advanced fMRI: Part II (G. Aguirre)

10:15-11:15am Breakout Session: Journal Club Discussion of

Specific fMRI Paper

11:15-11:30am Break

11:30-12:15pm Structural MRI, Morphometry, DTI (G. Aguirre)

12:15-1:30pm Lunch

IMAGING III

1:30-2:30pm "Other" Neuroimaging Methods: PET, SPECT

(ligands), NIRS, etc. (G. Aguirre)

2:30-2:45pm Break

2:45-4:00pm Perceptions & Misperceptions of Imaging

(G. Aguirre)

ELECTROPHYSIOLOGICAL METHODS I

4:00-5:00pm ERP, EEG, MEG, BEER (D. Wolk)

5:00-6:30pm BEER Hour!

Friday August 1st

ELECTROPHYSIOLOGICAL METHODS II

9:00-10:00am EEG Demonstration (D. Wolk, Leidy 109) 10:00-11:00am Brain Stimulation (D. Wolk, Leidy 109)

11:00-11:15 am Break

 11:15-12:15pm
 TMS/tDCS Lab [A] / Lunch [B] (D. Wolk)

 12:15-1:15pm
 TMS/tDCS Lab [B] / Lunch [A] (D. Wolk)

Note: TMS/tDCS Labs will be held in Goddard Labs, which is next door

to Leidy Labs. Boot Camp Staff will be available to direct you.

COGNITION

1:15-1:30pm Return to IRCS

1:30-2:45pm Overview of Cognition & the Brain (M. Farah)

2:45-3:00pm Break

3:00-4:45pm Memory (M. Farah)

4:45-5:15pm Executive Function (M. Farah)

Saturday	SOCIAL-AFFECTIVE NEUROSCIENCE I				
August 2 nd	9:00-10:00am	Emotion & the Brain (J. Kable)			
	10:00-10:15am	Break			
	10:15-11:30am	Reward Systems & Negative Affect (J. Kable)			
	11:30-12:15pm	The Role of Executive Function in Emotion			
		(J. Kable)			
	12:15-1:30pm	Lunch at IRCS			
	1:30-2:15pm	Applied Affective Neuroscience: Addiction			
		(J. Kable)			
	2:15-3:00pm	Applied Affective Neuroscience: Economic			
		Behavior (J. Kable)			
	3:00-3:15pm	Break			
	3:15-4:30pm	Social Neuroscience (J. Kable)			

Sunday August 3rd

FREE DAY

Monday
August 4th

SOCIAL-AFFECTIVE NEUROSCIENCE II

9:00-11:00am Neuroscience of Social-Affective Disorders
(S. Rushing)

11:00-11:15am Break

11:15-12:15pm Breakout Session: In-Depth Discussion of

Specific Social & Affective Disorders

12:15-1:30pm Lunch

COGNITION II

1:30-1:45pm Group Photo

1:45-4:00pm Pathologies of Cognition: Alzheimer's, FTD, Parkinson's Plus (A. Chatterjee)

4:00-4:15pm Break

4:15-5:15pm Breakout Session: Special Topics in Cognitive Neuroscience

6:30pm Dinner with Penn Neuroscience grad sudents

(meet in hotel main lobby) (optional)

Tuesday August 5th

CHANGE AND DIFFERENCE I

9:00-11:00am Brain Development (M. Farah)

11:00-11:15am Break

11:15-12:15pm Normal Brain Aging (D. Wolk)

12:15-1:30pm Lunch

1:30-2:30pm Breakout Session: Brain Development & Aging

2:30-2:45pm Break

2:45-4:15pm Individual Differences: Personality, Intelligence

& the Brain (J. Kable)

4:15-5:15pm Sex Differences in Brain Function (J. Kable)

Wednesday August 6th

CHANGE AND DIFFERENCE II

9:00-10:00am Breakout Session: Special Topics on

Neuroscience of Individuality & Gender

10:00-10:15am Break

CONCLUSIONS

10:15-12:15pm New Applications of Neuroscience in Society

(M. Farah)

12:15-1:30pm Lunch

1:30-2:15pm Wrap-Up Discussion: Ways to Learn More

Neuroscience; How Will You Use More

Neuroscience in Your Career? (M. Farah)

2:15-2:30pm Break

2:30-3:00pm Evaluations

6:00-9:00pm Farewell Reception and Dinner

(Singh Center for Nanotechnology, Glandt Forum,

3205 Walnut St.)

FACULTY

Geoffrey K. Aguirre, MD, PhD, Associate Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania; Associate Director, Penn Center for Neuroscience & Society

Dr. Aguirre is both a neurologist and a cognitive neuroscientist whose clinical and research work concerns the organization of the brain for mental operations, in particular the loss and recovery of visual ability. Using fMRI, he studies how neurons represent the appearance of people, places, and things, how blindness changes the brain, and how the brain adapts to the recovery of vision. As a clinician, he treats patients with a variety of disturbances of thinking and memory, with his practice informed by recent insights into the organization of the brain for these functions.

Anjan Chatterjee, MD, Elliott Professor, Chair, Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania

Dr. Chatterjee's research focuses on human cognition, especially language, aesthetics, and visual-spatial cognition. His 2004 *Neurology* article on "cosmetic neurology" established him as a leader on the clinical side of neuroethics. Dr. Chatterjee has served as a member of the Committee on Ethics, Law and Humanities of the American Academy of Neurology, and as CME Course Director for the Penn Center for Neuroscience & Society. At present, he is the President of the Behavioral and Cognitive Neurology Society, a member of the Center for Cognitive Neuroscience at the University of Pennsylvania, and coeditor of *Neuroethics in Practice* with Martha Farah.

FACULTY

Martha J. Farah, PhD, Director, Penn Center for Neuroscience & Society; Walter H. Annenberg Professor of Natural Sciences, Department of Psychology, University of Pennsylvania

Dr. Farah is a cognitive neuroscientist who works on problems at the interface of neuroscience and society. She studies the effects of childhood poverty on brain development, the expanding use of neuropsychiatric medications by healthy people for brain enhancement, novel uses of brain imaging, and the many ways in which neuroscience is changing the way we think of ourselves as physical, mental, moral and spiritual beings. She has published over 150 peer-reviewed journal articles and seven books, including *Neuroethics: An Introduction with Readings* and *Neuroethics in Practice*, co-edited with Anjan Chatterjee.

Joseph Kable, PhD, Baird Term Assistant Professor of Psychology, Department of Psychology, University of Pennsylvania

Dr. Kable's research employs an interdisciplinary approach to understanding how people make choices, and the neurophysiological mechanisms underlying decision-making. This work combines approaches from experimental economics, the psychology of judgment and decision-making, and social and cognitive neuroscience.

Mike Kaplan, PhD, Lecturer and Lab Instructor, Biological Basis of Behavior Program, University of Pennsylvania

Dr. Kaplan's research focuses on synaptic plasticity, both short-term and long-term. He is the Master of Ceremonies and head zookeeper at the Neurolab, an undergraduate teaching lab for electrophysiology and computer simulations.

FACULTY

Susan E. Rushing, MD, JD, Clinical Associate, Perelman School of Medicine, University of Pennsylvania

Dr. Rushing is actively involved in resident and medical student education at the Perelman School of Medicine and in Penn's psychiatry residency programs as the course director for Forensic Psychiatry. She serves on the University of Pennsylvania Health System ethics committee and conducts ethics consultations at the Hospital of the University of Pennsylvania.

David Wolk, MD, Assistant Professor of Neurology, Cognitive Neurology Division, University of Pennsylvania

Dr. Wolk's research has focused on memory measures and other markers that allow for early detection of Alzheimer's disease. He currently investigates memory changes in healthy aging, Mild Cognitive Impairement, and Alzheimer's disease using Event-Related Potentials (a form of EEG), MRI (including structural and functional measures), and novel psychometric testing.

BREAKOUT GROUP GUEST FACULTY

Stephen Morse, JD, PhD, Ferdinand Wakeman Hubbell Professor of Law, Professor of Psychology and Law in Psychiatry, University of Pennsylvania Law School; Associate Director of the Penn Center for Neuroscience and Society

Dr. Morse is an expert in criminal and mental health law, whose work emphasizes individual responsibility in criminal and civil law. He works on problems of legal and moral responsibility and their compatibility with the materialist worldview of neuroscience. Dr. Morse is interested in the roles of neuroscience and behavioral science in explaining and excusing antisocial and criminal behavior. He is co-editor of *A Primer on Criminal Law and Neuroscience* with Adina Roskies, and was the recipient of the American Psychiatric Association's 2014 Isaac Ray Award for distinguished contributions to forensic psychiatry and the psychiatric aspects of jurisprudence.

BREAKOUT GROUP GUEST FACULTY

Amy Wax, JD, MD, Robert Mundheim Professor of Law, University of Pennsylvania Law School

Dr. Wax's work addresses issues in social welfare law and policy as well as the relationship of the family, the workplace, and labor markets. She has training in biomedical sciences and appellate practice as well as an interest in economic analysis. Dr. Wax has published articles that address disparate impact theory and group demographics, and the relationship of rational choice to family structure. Her most recent book is *Race*, *Wrongs and Remedies: Group Justice in the 21*st *Century*, and Dr.Wax has received the A. Leo Levin Award for Excellence in an Introductory Course and the Harvey Levin Memorial Award for Teaching.

STAFF

Sara Strickland, Associate Director of Programs & Operations, Penn Center for Neuroscience and Society

Sara Strickland came to the Center for Neuroscience and Society from the Free Library of Philadelphia, where she managed the *One Book, One Philadelphia* literacy program. Her career has been focused on building capacity for nonprofits through strategic partnerships around development, marketing, and public programming. At CNS, Sara works to further the center's mission through coordination of events and educational opportunities for scholars, faculty, and professionals in affiliated fields.

Sue Yee Chen, Program Coordinator, Penn Center for Neuroscience and Society

Prior to joining CNS, Sue Yee served as Outreach Manager with Community Partnership School as a part of the Philly Fellows Program. In this role, she developed support for CPS initiatives through cultivation of organizational partnerships and development opportunities. Sue Yee is an alumna of Bryn Mawr College, where she earned her B.A. in Sociology and Education.

The Penn Center for Neuroscience and Society would also like to thank Program Assistants Dominique Caggiano and Juliet Crain as well as Boot Camp Intern Robert Pauszek for their invaluable assistance in preparing for this program.

2014 PARTICIPANTS

Debra Austin received her JD from the University of San Francisco and her PhD in Education from the University of Denver. Debra teaches legal skills and she is interested in how neuroscience research can improve teaching and learning effectiveness.

Darla Castelli studies the effects of physical activity on cognitive and brain health among children.

Federica Coppola is a PhD researcher in Law at the European University Institute (Florence, Italy), and fellow at the European Centre for Law, Science and New Technologies (University of Pavia, Italy). Her main research interest concerns the interaction between criminal law and neuroscience.

Candace Delmas received her PhD from Boston University, her MA from Georgia State University, and a Master 2 in Ethics and Politics from the Université of Paris IV, Sorbonne. She specializes in philosophy of law, social and political philosophy, and ethics.

Jeremy Dolan is a PhD candidate in philosophy at New York University. He is interested in visual perception, rock climbing, and social justice.

Leyla Eraslan is pursuing a career in Expressive Arts Therapy at John F. Kennedy University in California. She has come to believe that imagination is the first step in progress. Leyla expresses her excitement to "return to my home city and to learn even more about my favorite subject: us."

Jonathan Fabrey is an AP & IB Psychology teacher at Philadelphia's Central High School. His education includes an MS in Counseling & Clinical Health Psychology from the Philadelphia College of Osteopathic Medicine.

Harvey Fiser is an Associate Professor of Business Law at Millsaps College. His areas of research include the intersection of neuroscience and developments in employment law.

Leonard Grant is pursuing his PhD in Rhetoric and Writing at Virginia Tech. For his dissertation, Lenny is researching the rhetorical ecologies of military post traumatic stress disorder.

2014 PARTICIPANTS

Daniel Green is Director of Freedom and Free Enterprise at the John Templeton Foundation, where he has been since July 2011. At JTF, he oversees grantmaking in individual, religious, and economic freedom around the world.

Dorian Hall has worked with the Ohio Public Defender's Office for twenty-five years conducting social history investigations. He finds the developments in neuroscience during those years to be incredibly fascinating.

Patrick Hopkins is a philosopher specializing in moral psychology, medical ethics, and issues of neuroscience, law and policy.

Peggy Hora is a retired Superior Court judge, founder of drug treatment courts, and global leader on problem-solving courts.

Matthew Langione is an advanced doctoral candidate in English at the University of California, Berkeley with degrees in philosophy and the history of science. He is currrently writing a dissertation on the neuroaesthetics of poetry and portraiture.

Andrew Lee is a PhD student in Philosophy at New York University. His research interests are mainly on the nature of consciousness.

Crystal L'Hote recieved her PhD from Johns Hopkins University and is now Associate Professor of Philosophy at St. Michael's College in Vermont. She is beginning to write a book tentatively titled *The Neuroscientist's Dilemma* and hopes to contribute to the public conversation about emerging neurotechnologies.

Sarah Lustbader, JD is a criminal defense attorney at the Bronx Defenders, a holistic organization providing legal services to indigent people in the South Bronx.

Wendy Mages is a faculty member at Mercy College and earned her doctoral degree in Human Development and Psychology at the Harvard Graduate School of Education. Her research focuses on the effect of educational strategies and contexts on language, cognitive, and social development.

Karen Maschke has expertise in the legal, ethical, and policy issues surrounding the development and use of new biomedical technologies.

Jonathan Nguyen graduated from the University of Pennsylvania in 2003 with a degree in Biology, and earned an MSEd in 2004. He currently teaches AP Biology at Pennsauken High School in Pennsylvania.

2014 PARTICIPANTS

Brendan O'Sullivan works on issues in the philosophy of mind, focusing recently on philosophical accounts of pain.

Diana Robertson, PhD is a professor of Legal Studies and Business Ethics at the Wharton School. Her research centers on business ethics and corporate social responsibility, with a particular interest in neuroimaging and moral reasoning.

Julia Skolnik, MSEd is a Manager & Curriculum Specialist at The Franklin Institute. She oversees projects involving inquiry-based science curriculum and professional development for educators. She is currently developing a high school neuroscience course in conjunction with the Franklin Institute's new "Your Brain" exhibit.

Katherine Snyder is a Chemical Engineer, Positive Psychology Expert, and Global Business Manager. Katie is most interested in how the human sciences can be applied to help teams and organizations to thrive.

Karyn Stanton is a full-time Year Five teacher and postgrad student from Perth, Western Australia. A preliminary title for her research project is: Neuroscience, Metacognition, and "Harmonious Development."

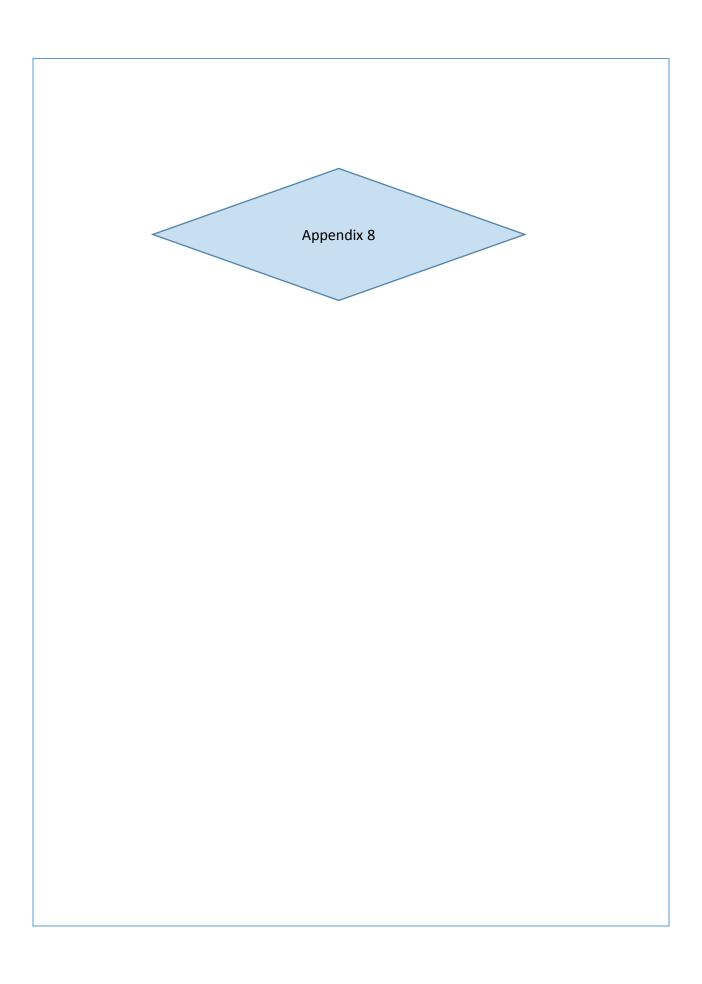
Pamela Stone is a biocultural anthropologist whose research explores maternal morbidity and mortality across the globe and through time.

Sridhar Velamakanni is a Financial Services professional with over ten years of analytical experience in the financial industry.

Nicole Vincent is a philosopher whose scholarly pursuits center on the concept of responsibility, and span across the fields of neuroethics, neurolaw, ethics, philosophy of tort and criminal law, and political philosophy.

Carolyn Youngberg is the Deputy District Attorney for the County of San Bernardino, California. She has been a trial attorney for fifteen years, the past twelve of which have been spent prosecuting a variety of felonies, including homocides. Carolyn is currently prosecuting death penalty cases. She has also spent the past eight years in the hardcore gang unit, prosecuting both gang felonies and homocides.

The mission of the Center for Neuroscience & Society is to increase understanding of the impact of neuroscience on society through research and teaching, and to encourage the responsible use of neuroscience for the benefit of humanity. neuroethics.upenn.edu



Praise for the CNS's Neuroscience Boot Camp

"The Penn Neuroscience Boot Camp was a fantastic crash course on the human brain. The instructors were first-rate. Just as enjoyable as the lectures and lab tours was the chance to get to know the other participants. As a science policy professional, it's amazing how many ways I've been able to use what I learned."

Erin Heath, M.Sc.

Office of Government Relations, American Association for the Advancement of Science (AAAS)

"The Penn Neuroscience Boot Camp provides a well-planned and accessible introductory curriculum, delivered by a team of terrifically engaging speakers. Short of enrolling in a full-time neuroscience program, this is the best available immersion. So people wanting to learn the basics about neuroscience, and why it is so significantly affecting so many disciplines (including law), should take this course."

Owen D. Jones, J.D.

Director, MacArthur Foundation Research Network on Law and Neuroscience; Prof. of Law & Prof. of Biological Sciences at Vanderbilt University

"It was an outstanding experience in every way. The lectures were consistently excellent and the field visits were highly informative. My fellow "students" were diverse, engaged, intelligent and interesting, with an extraordinary range of professional accomplishments."

Tamar Szabo Gendler, Ph.D. Chair, Department of Philosophy, Yale University

"A neuroscientist, a theologian, and a diplomat walk into a bar... The beginning of a joke for some but not if you're at Boot Camp! Thanks for an incredible two weeks of engaging faculty, diverse participants, and in-depth learning."

Jennifer Hoffman

Foreign Service Officer with the U.S. Department of State

"What I learned over the course of the ten days at Penn has made me look at my research in entirely new ways. The boot camp was an incredibly stimulating experience."

Patrick Sharkey, Ph.D. Assistant Professor of Sociology, New York University

"I am able to bring a new depth of knowledge and different perspective to my research as a philosopher of mind. It was also invaluable to my work as the director of an interdisciplinary cognitive science program, and has energized my work with undergraduate students working in many disciplines who are interested in exploring the intersections of neuroscience with other fields and broader questions."

Laura Sizer, Ph.D. Associate Professor of Philosophy, Hampshire College

"I wanted to get a truly rigorous introduction to neuroscience, even though I don't have a science background. I got what I needed, and much more. I highly recommend this learning experience."

Victoria Pitts-Taylor, Ph.D. Professor of Sociology, City University of New York

"I learned more in the ten days of the Neuroscience Bootcamp than in ten years of studying neuroscience on my own. Twist the arm of every administrator you know to get them to help you fund your attendance at this short course. It will launch you into an unbelievably well-organized and understandable wealth of information—and vastly improve your research!"

Barbara A. Oakley, Ph.D. Associate Professor of Engineering, Oakland University in Michigan



Hello Neuroscience Boot Camp Alumni! Here are some highlights from what you sent:

Dean Blevins, a professor at the Nazarene Theological Seminary, has published several articles on neuroscience, education and youth, including "Brain Matters: Neuroscience and Creativity" in Religious Education (2012), and is currently working on a monograph on neuroscience and Christian education.

Anthony Dardis, on the Philosophy faculty at Hofstra, has been engaging with neuroscience colleagues regarding the Libet experiments, incorporating neuroscience in his Philosophy of Mind course, and working on a new article on dopamine and mental causation.

Writer **Kevin Davis** is a work on a new book, to be called The Brain Defense: The clash of neuroscience, law and criminal responsibility. As part of his research he will be interviewing Boot Camp alum Owen Jones as well as Boot Camp lecturer Geoff Aguirre. The book will be published by Penguin Press in 2016.

Jennifer Drobac, on the faculty at Indiana University Law School, has incorporated neuroscience into her scholarship in the area of teen law. She has published a number of articles on this topic, as well as one on elderlaw, and U of Chicago Press will soon publish her book <u>Worldly But Not Yet Wise: Teen Sexual Exploitation</u>, <u>Adolescent Development and Consent Law</u>. She also organized a conference this past March on "Neuroscience and the Law: Injury, Capacity, and Illness."

Jeff Fry, a professor at Ball State, includes neuroethics in his course on "Mind, Brain and Soul and is planning a sabbatial project for next year on neuroethics in sports.

Mattia Gallotti is now the Project Coordinator of the Human Mind Project, based at the University of London. He works closely there with neuroscientist Colin Blakemore and has also collaborated on writing projects with neuroscientist Chris Frith of Cambridge. He recently taught cognitive science at the ESSEC school in Paris.

Ruth Greenberg, an attorney in Massachusetts who also teaches at Boston University, reports putting her Boot Camp learning to use frequently in her efforts to win post-conviction relief for her clients.

Marybeth Herald, on the faculty of the Thomas Jefferson School of Law, reports bringing a bit of neuroscience into her constitutional law classes. She also reports that her child is majoring in neuroscience in college (not sure if Boot Camp can claim credit for that!). She has a book forthcoming from Carolina Academic Press called Your Brain and Law School.

Renee Jones was just promoted to Professor at Boston College of Law and is using insights from neuroscience in her work on incentives, corporate governance and regulation. For example, she has applied some findings from social neuroscience in her forthcoming article on "Risk, Personality and Fraud."

Highlights, cont.

Ingrid Miller from the Phoenix Arizona Office of Legal Advocate tells us that she is using her Boot Camp training every day, working on the constitutionality of lethal injection as a method in capital cases, collaborating with a psychiatrist studying pain in minimally conscious states, and delving into the details of neuropsych testing done on her clients. She says she's "ready for Boot Camp Part II – The Return of the Sea Slug."

Oliver Rollins is finishing up his doctoral dissertation at UCSF, and will be coming back to Penn for a post-doc in the Program for Race, Science and Society!

Tim Ryan will be starting as an Assistant Professor of Political Science at UNC-Chapel Hill in the fall. He is working on "moralized politics" which includes evidence on moral decision making from brain imaging and other neuroscience methods. He is hoping to establish collaborations with the neuroscientists at UNC.

Lisa Sansom, working with the Canadian Positive Psychology Association, has been using her Boot Camp experience to relate neuroscience and positive psychology. She uses this information when addressing corporate audiences, and finds them "quite mesmerized" by the brain research.

Mim Schwartz is serving as Patient Advocate at Brown University for a study of Deep Brain Stimulation for OCD and continues her work on the Board of National Alliance for the Mentally Ill (NAMI). She is also working with the new DBS/OCD neurosurgery committee at the University of Pittsburgh Medical Center.

Francis Shen has a few small neuroscience activities to report (joke): co-authoring the first neurolaw case book, <u>Law & Neuroscience</u>, with Boot Camp alum and supporter Owen Jones, serving as Executive Director of Education and Outreach for the MacArthur network on law and neuroscience, writing numerous other neurolaw articles available on SSRN, and teaching neurolaw and other subjects at the University of Minnesota Law School.

Isaac Mwaase sends a short note mentioning courses he is teaching for the University of Phoenix, some of which have incorporated neuroscience.

Jesse Summers, now a postdoc in the Kenan Institute for Ethics at Duke University as well as Duke's Writing Program and Philosophy Department. He is working in the Moral Actions and Decision-Making Lab, and reports that Boot Camp has helped him avoid being "overwhelmed by fMRI blobs as evidence for grand conclusions..." as well as preparing him for a new project on cognitive enhancement using stimulant medication.

Lauren Wolf is continuing as an editor and writer at Chemical and Engineering News, where she now covers chemical neuroscience, including recent articles on caffeine safety, the link between pesticides and Parkinson's disease, and the White House BRAIN initiative.

Other Boot Camp Alumni Sightings

We have noticed Penn Boot Camp alums turning up in interesting places and doing interesting things related to neuroscience... We wish we knew more, but for now we'll share the following news from the people who did not write (sniff...):

In addition to the books already mentioned, we've seen some other neuro-related books come out and/or heard that they are in the works:

Peter Alces's, Neuroscience, Law, and Morality (tentative title), University of Chicago Press, forthcoming

Michael Chorost's World Wide Mind: The Coming Integration of Humanity, Machines, and the Internet, Free Press, 2011

Ian Leslie's Born Liars: Why We Can't Live Without Deceit, Quercus Books, 2011

Barbara Oakley's A Mind For Numbers: How to Excel at Math and Science (Even If You Flunked Algebra), Tarcher, 2014

Erik Parens's co-edited monograph <u>Interpreting Neuroimages: An Introduction to the Technology and Its Limits</u>, Hastings Center Report, 2014.

Some of our journalist alums have been busy applying what they learned at Boot Camp:

Check out **Mark Roth's** spell-binding series of feature articles on neuropsychiatric disorders at post-gazette.com/news/health/2013/05/12/Mysteries-of-the-Mind-The-Series-1/stories/201305120225.

Nicky Pentilla is editing the Dana Foundation's website, the leading source for laypersons to learn about neuroscience, <u>dana.org</u>.

Education writer **John Higgins** took his newfound neuroscience background to MIT as a McKnight Science Journalism Fellow and has a book in the works on teaching and learning.

Boot Camp alums have organized some terrific conferences, bringing together scholars and scientists from around the world, including fellow Boot Campers. It's wonderful to see the connections forged at Boot Camp continuing like this!

Laura Sizer organized "From NeuroSelves to NeuroSocieties," supported by the Foundation for Psychocultural Research (where Boot Camp alum Connie Cummings is Project Director) and Hampshire College, which featured talks by numerous Boot Camp alums: Barbara Bottalico, Laura Cabrera, John Fennel, Jane Campbell Moriarty, Victoria Pitts-Taylor and Chris Zarpentine.

Laura Cabrera and **Georgia-Martha Gkotsi** teamed up to organize a meeting hosted at the beautiful Brocher Foundation campus in Switzerland on "Neuroscience, Ethics and Law: new challenges for human identity, freedom and responsibility."

Julie Seaman, as President of the Society for Evolutionary Analysis in Law, convened the Society's annual meeting at Penn with several other Boot Camp alums on the program: Peter Alces, Jennifer Drobac, Dena Gromet, Owen Jones, Adam Kolber, and Jane Campbell Moriarity.

And our teachers, Tim Best, Jaskiran Kaur, and Kim White, working in the School District of Philadelphia, have each taught a grade 11-12 Neuroscience course after attending Boot Camp, facilitated by Boot Camp alum Luke Van Meter of Science Leadership Academy. To see one lovely example of how the team is making neuroscience accessible and fun, check out the Neurotransmitter Game: vimeo.com/87713135 (password: neurogame).

News from the Center for Neuroscience & Society:

New CNS Website

As for the CNS, there is much to report! We have a new and improved website, (<u>neuroethics.upenn.edu</u>). It features a new Online Learning Center, with videos in case you are craving more neuroscience lectures! We are especially excited about our new graduate certificate program in neuroscience, SCAN, (<u>neuroethics.upenn.edu/scan</u>). What an amazing group of students we have enrolled for this!

Support CNS!

A great piece of Boot Camp news is the generous donation from one you (who prefers to remain anonymous) to support five Boot Camp Fellowships. This was most welcome, especially now that the MacArthur program funding has ended. Needless to say, with vanishing federal funds and tight university budgets, additional help with Boot Camp, SCAN, or other CNS programs will be mightily appreciated!

New Programs

Stay tuned for some new programs being planned for the summer of 2015. We're still playing with ideas, but neurolaw and/or neuroethics seem like natural topics so at least one of those will likely be offered. We may poll you all at some point regarding topics, length and format, to see if there is some formula that a number of you would find especially appealing and useful.

Staff Changes

The CNS has had some staff changes since the 2009 Boot Camp class. **Joe Powers**, who served as Managing Director for the first year, has filled a number of exciting positions within the Provost's Office at Penn since then. **Denise Clegg** transitioned from Managing Director of the CNS to Deputy Executive Director of the Garrison Institute last year, fulfilling her dream of working more directly with the contemplative sciences (a Boot Camp alum herself, you may remember the meditation sessions she offered at days' end). **Sara Strickland**, who has been with us for two years, is now at the helm as CNS Director of Programs and Operations, and we recently hired **Sue Yee Chen** as Program Manager (meaning she will live and breathe Boot Camp starting in July!).

"Your Brain" Exhibit

On June 14th the Franklin Institute's wonderful new permanent exhibit, Your Brain, opened. CNS played a part in developing this exhibit, but in the end we are simply awed by its splendor – it's interesting, fun and *beautiful*. Next time you are in Philly, you must see it! <u>fi.edu/exhibit/your-brain</u>

We will write again asking for your news next year, with another newsletter to follow. In the meantime, we wish you all the best!

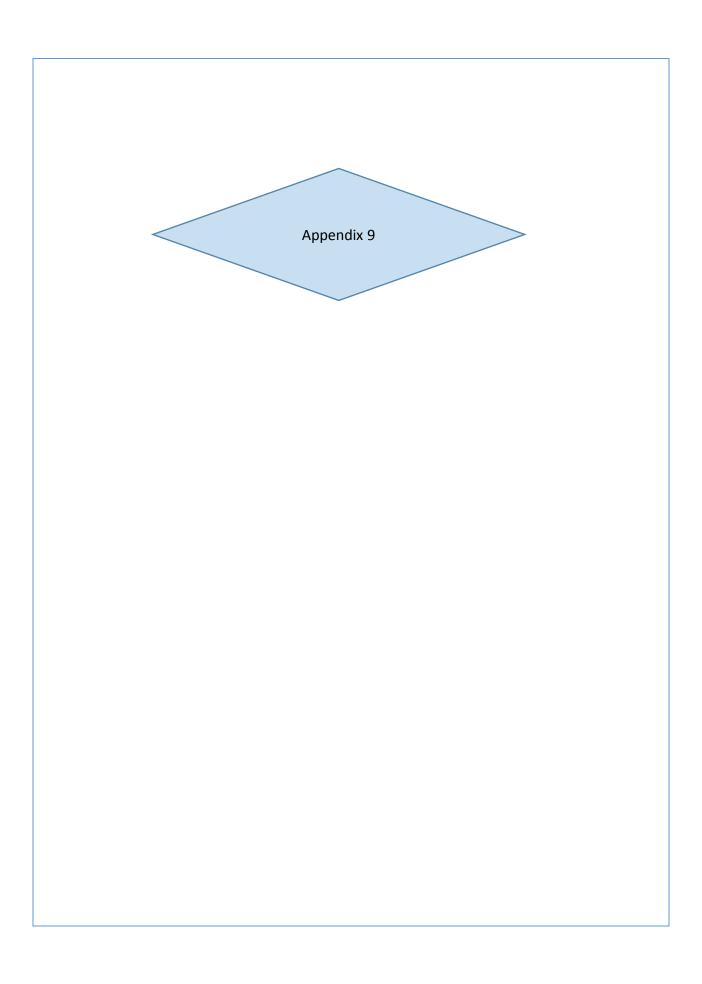
Sincerely,

Martha Farah

Maken

Walter H. Annenberg Professor in Natural Sciences

Director, Center for Neuroscience & Society



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PENN CONFERENCE ON CLINICAL NEUROSCIENCE AND SOCIETY

CME-CERTIFIED COURSE

Friday - Sunday, July 23-25, 2010

Biomedical Research Building II/III University of Pennsylvania School of Medicine 421 Curie Boulevard Philadelphia, PA 19104





Center for Neuroscience & Society at the University of Pennsylvania Presents

PENN CONFERENCE ON CLINICAL NEUROSCIENCE AND SOCIETY



A CME-CERTIFIED COURSE

July 23-25, 2010



Biomedical Research Building II/III
University of Pennsylvania
School of Medicine
421 Curie Boulevard
Philadelphia, PA



Course Directors

Anjan Chatterjee, MD, FAAN

Martha J. Farah, PhD



PROGRAM OVERVIEW & TARGET AUDIENCE

Neuroethics is a new field concerned with the wide array of ethical, legal and social issues raised by neuroscience. The field has grown rapidly in the last 5 years, as measured by the number of new conferences, journal articles, books and journals devoted to Neuroethics. Advances in neuroscience are also creating a whole new set of ethical issues related specifically to the clinical neurosciences. Practitioners in neurology, neurosurgery, psychiatry and their pediatric subspecialties, as well as neurorehabilitation, clinical neuropsychology, clinical bioethics, and the myriad of other clinical specialties including nursing, social work and geriatrics grapple with issues of mind and brain. Clinicians familiar with traditional ethical issues of medical practice will find themselves confronted with a host of special issues that arise when treating the brain, especially as our understanding of the neural underpinnings of cognitive and affective systems advances. Our goal is to bring together a set of clinically important neuroethical topics, whose pragmatic relevance to the clinician is matched by their intellectual fascination to anyone interested in mind-brain relations.

Learning Objectives

At the conclusion of this program, learners should be able to:

- Discern the appropriate and inappropriate use of imaging in diagnosing neuropsychiatric diseases
- Identify and correct common misunderstandings on the part of patients and families concerning the use of imaging in neurology and psychiatry
- Review risks and benefits associated with psychopharmacology for patients with minor psychiatric complaints
- Describe recent advances in brain-machine interface technology and its clinical potential for the treatment of paralysis, movement disorders, dementia, mood and anxiety disorders
- Establish relevant patient abilities for assessing legal competency in key areas including activities of daily living, driving and financial independence
- Discuss the role of clinical neuroscience in legal proceedings and anticipate the specific issues to which healthcare professionals may be asked to address in depositions and court room testimony.

Hosting Department

The *Penn Conference on Clinical Neuroscience and Society* is hosted by the Center for Neuroscience & Society at the University of Pennsylvania.



Accreditation

The University of Pennsylvania School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The Department of Psychiatry University of Pennsylvania is approved by the American Psychological Association to sponsor continuing education for psychologists. The Department of Psychiatry University of Pennsylvania maintains responsibility for this program.

Designation of Credit

Physicians: The University of Pennsylvania School of Medicine designates this educational activity for a maximum of 14 *AMA PRA Category 1 Credits*TM. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Psychologists: The Department of Psychiatry University of Pennsylvania designates this education for a maximum of 14 credits.

Disclosures

University of Pennsylvania School of Medicine, Office of Continuing Medical Education, adheres to the ACCME *Standards for Commercial Support*. Faculty disclosure information will be made available in the conference materials and syllabi. Faculty members are also expected to disclose to participants any discussions of off-label and/or investigational uses of pharmaceutical products within their presentations.

Registration Fees

The registration fees for the Penn Conference on Clinical Neuroscience and Society are \$395 for Physicians, Attorneys, and Industry; \$349 Allied Health Professionals, Residents and Fellows, Post-doctoral Students, Penn faculty and staff; \$299 all other Students. The fee includes course registration, continental breakfasts, lunch on Friday and Saturday, a reception on Friday, and refreshment breaks.

There will be an optional Conference Banquet on Saturday evening with an after-dinner lecture by Arthur Caplan, PhD, the world's most quoted bioethicist, speaking on bioethics and the brain. The cost of the banquet is \$75.

Registration forms may be mailed or faxed to the Office of Continuing Medical Education or you may register on-line at www.med.upenn.edu/cme and click on Calendar of Events. Please see the bottom of the registration form for contact information. All registrations will be confirmed in writing if the necessary form and fee are received by the Office of Continuing Medical Education by July 9, 2010.

Cancellation and Refund Policy

In order to process refunds for course withdrawals, cancellations must be received in writing by July 1, 2010. There will be a service charge equivalent to 10% of the registration fee until June 15th. From June 15th through July 1st, the service charge will be 50% of the registration fee. No refunds will be issued thereafter.

The University reserves the right to cancel or postpone any course due to unforeseen circumstances. In the event of cancellation or postponement, the University will refund any registration fees but is not responsible for any related costs or expenses to participants, including cancellation fees assessed by hotels, airlines, and travel agencies.

Meeting Location

The *Penn Conference on Clinical Neuroscience and Society* will take place from Friday through Sunday, July 23-25, 2010 at the University of Pennsylvania, Biomedical Research Building II/III, 421 Curie Boulevard, Philadelphia, PA 19104. Directions will be mailed to you with your registration confirmation letter.

If you require overnight room reservations, please call the Sheraton University City Hotel at 215-387-8000 to make your reservation. Please identify yourself as an attendee of the *Penn Conference on Clinical Neuroscience* A block of rooms has been reserved for July 22 through July 25 at the special rate of \$149 plus applicable taxes at the time of checkout, currently 15.2%. The hotel is located at 3600 Chestnut Street, Philadelphia, PA. If you wish to book online, the following is the booking link: http://www.starwoodmeeting.com/Book/PennConfNeuroscience.

There is an additional block of rooms at the Hilton Inn at Penn at 215-222-0200. Please identify yourself as an attendee of the *Penn Conference* on *Clinical Neuroscience*. The rooms have been reserved from July 22 through July 25 at the special rate of \$209 plus applicable taxes at the time of checkout, currently 15.2%. This rate will be available until Saturday, June 19, 2010 or when the block is filled, whichever occurs earlier. The Inn at Penn is located at 3600 Sansom Street, Philadelphia, PA. The phone number is 215-222-0200. If you wish to book online, please use the following link: http://www.hilton.com/en/hi/groups/personalized/PHLIDHH-PCC-20100719/index.jhtml.

Services for the Disabled If special arrangements are required for an individual with a disability to attend this meeting, please contact the Office of Continuing Medical Education no later than July 9, 20010, at 215-898-8005.

Nondiscrimination Statement The University of Pennsylvania values diversity and seeks talented students, faculty, and staff from diverse backgrounds. The University of Pennsylvania does not discriminate on the basis of race, sex, sexual orientation, gender identity, religion, color, national or ethnic origin, age, disability, or status as a Vietnam Era Veteran or disabled veteran in the administration of educational policies, programs or activities; admissions policies; scholarship and loan awards; athletic, or other University administered programs or employment. Questions or complaints regarding this policy should be directed to Executive Director, Office of Affirmative Action and Equal Opportunity Programs, 3600 Chestnut Street, Sansom Place East Suite 228, Philadelphia PA 19104-6106 or 215-898-6993 (Voice) or 215-898-7803 (TDD). www.upenn.edu/affirm-action



Course Directors

Anjan Chatterjee, MD, FAAN Professor of Neurology University of Pennsylvania School of Medicine Philadelphia, PA

Martha J. Farah, PhD Walter H. Annenberg Professor in the Natural Sciences University of Pennsylvania Philadelphia, PA

Guest Faculty

Paul S. Appelbaum, MD Elizabeth K. Dollard Professor of Psychiatry, Medicine, & Law Director, Division of Law, Ethics, and Psychiatry Department of Psychiatry Columbia University School of Medicine New York, NY

James Blair, PhD
Chief, Unit on Affective
Cognitive Neuroscience
Mood and Anxiety
Disorders Program
National Institute of Mental Health
National Institutes of Health
Bethesda, MD

Joseph J. Fins, MD Chief, Division of Medical Ethics Professor of Medicine and Public Health Director of Medical Ethics New York Presbyterian Hospital Weill Cornell Medical College New York, NY Daniel C. Marson, JD, PhD Professor of Neurology Director of the Division of Neuropsychology Director of the Alzheimer's Disease Center University of Alabama at Birmingham Birmingham, AL

Helen S. Mayberg, MD Professor of Psychiatry and Neurology Dorothy Fuqua Chair in Psychiatric Neuroimaging and Therapeutics Emory University School of Medicine Atlanta, GA

Alan F. Schatzberg, MD
Kenneth T. Norris, Jr. Professor
and Chairman
Department of Psychiatry and
Behavioral Sciences
Stanford University
School of Medicine
Stanford, CA
President of the American
Psychiatric Association

Daniel R. Weinberger, MD
Director, Genes, Cognition and
Psychosis Program
Intramural Research Programs
National Institute of Mental Health
National Institutes of Health
Bethesda, MD

Keynote Speaker

A. Thomas McLellan, PhD
Deputy Director
Office of National Drug
Control Policy
Executive Office of the President
Washington, DC

Banquet Featured Speaker

Arthur Caplan, PhD
Sidney D. Caplan Professor
of Bioethics
Emmanuel and Robert Hart
Director of the Center for Bioethics
University of Pennsylvania
Philadelphia, PA

Faculty

John A. Detre, MD Professor of Neurology and Radiology Director, Center for Functional Neuroimaging University of Pennsylvania School of Medicine Philadelphia, PA

Jonathan D. Moreno, PhD David and Lyn Silfen University Professor University of Pennsylvania Philadelphia, PA

Stephen J. Morse, JD, PhD Ferdinand Wakeman Hubbell Professor of Law & Professor of Psychology and Law in Psychiatry University of Pennsylvania Law School and School of Medicine Philadelphia, PA Charles P. O'Brien, MD, PhD
Kenneth Appel Professor
Director, Center for Studies
of Addiction
Vice Director, Institute of
Neurological Science of Medicine
Department of Psychiatry
University of Pennsylvania
School of Medicine
Philadelphia, PA

Michael E. Thase, MD Professor of Psychiatry Chief, Division of Mood and Anxiety Disorders Treatment & Research Program University of Pennsylvania School of Medicine Philadelphia, PA



Friday, July 23, 2010

8:00 AM Registration
9:00 AM Welcome

Anjan Chatterjee, MD, FAAN

9:10 AM Orientation to Clinical Neuroscience and Society

Martha J. Farah, PhD

IMAGING: PICTURING MINDS IN HEALTH AND DISEASE

9:30 AM Case Study Presentation Helen S. Mayberg, MD

9:40 AM Scientific Overview and Frontiers

John A. Detre, MD

10:40 AM **Break**

11:00 AM Ethical, Legal, and Societal Implications (ELSI)

Daniel R. Weinberger, MD

11:55 AM Discussion of Case; Q & A

Helen S. Mayberg, MD

12:15 РМ **Lunch**

DEVICES: RISE OF THE MACHINE

1:30 PM Case Study Presentation Joseph J. Fins, MD

1:40 PM Scientific Overview and Frontiers

Helen S. Mayberg, MD

2:45 PM **Break**

3:00 PM **ELSI**

Jonathan D. Moreno, PhD

3:55 PM Discussion of Case; Q & A

Joseph J. Fins, MD

4:25 PM Adjourn

4:25 PM Reception

Saturday, July 24, 2010

8:00 AM Registration and Continental Breakfast

PSYCHOPHARMACOLOGY: THIS IS YOUR BRAIN ON DRUGS

9:00 AM Case Study Presentation

Alan F. Schatzberg, MD

9:30 AM Scientific Overview and Frontiers

Michael E. Thase, MD

10:30 AM Break

Friday - Sunday July 23-25, 2010

AGENDA

10:45 AM **ELSI**

Anjan Chatterjee, MD

11:45 AM Discussion of Case; Q & A

Alan F. Schatzberg, MD

12:15 РМ **Lunch**

MEDICOLEGAL NEUROSCIENCE: MY BRAIN MADE ME DO IT!

1:30 PM Case Study Presentation
Charles P. O'Brien, MD, PhD

1:40 PM Scientific Overview and Frontiers

James Blair, PhD

2:25 PM Break

2:55 PM **ELSI**

Stephen J. Morse, JD, PhD

3:55 PM Discussion of Case; Q & A

Charles P O'Brien, MD

4:25 PM Adjourn

6:00 PM Conference Banquet

Featured Speaker: Arthur Caplan, PhD Autonomy, Addiction and the Brain:

Are We Giving Too Much Weight to Autonomy?

Inn at Penn

3600 Sansom Street, Philadelphia, PA

Sunday, July 25, 2010

8:15 AM Registration and Continental Breakfast

COMPETENCE: WHAT CAN I DO?

9:00 AM Case Study Presentation
Anjan Chatterjee, MD

9:30 AM Scientific Overview and Frontiers

Daniel C. Marson, JD, PhD

10:30 AM **Break**

10:45 AM **ELSI**

Paul S. Appelbaum, MD

11:45 AM Discussion of Case; Q & A

Anjan Chatterjee, MD

KEYNOTE CLOSING LECTURE

12:15 PM Ethical Considerations in

National Drug Policy Development

A. Thomas McLellan, PhD

1:00 PM Evaluation and Adjournment

CME Registration Form

PENN CONFERENCE ON CLINICAL NEUROSCIENCE AND SOCIETY

Please print or type

Friday – Sunday July 23-25, 2010

You may also register online at www.med.upenn.edu/cme and click on *Calendar of Events*

Name (First)	Name (First) (Last)					
Academic Degree						
Medical Specialty						
Affiliation (Hospital, Office	, or Company)					
Address (Affiliation or	Home)					
City	State		Zip			
Phone		Fax				
E-mail						
Industry Representation \$349 – Allied Post-doctoral Solution \$299 – Studen \$75 – Conference	Health Professionals Students, Penn Facul	s, Residents and lty and Staff ay, July 24 Saturday, July				
Payment Method						
Make check payable to		niversity of Penns cover	-			
Authorization Signature						
Cardholder Name						
Card #	Se	curity Code	Exp. Date			

Mail or Fax Payment and Registration Information to:

Conference Coordinator, University of Pennsylvania School of Medicine Office of Continuing Medical Education

333 Blockley Hall, 423 Guardian Drive, Philadelphia, PA 19104-6021 Phone: 215-898-8005 or 215-898-9800 | Fax: 215-898-1888 penncme@mail.med.upenn.edu

Please Note: Walk-in registrants must bring payment to the program. Seating may be limited for walk-in registrants.

Continuing Medical Education



Center for Neuroscience & Society at the University of Pennsylvania Presents

PENN CONFERENCE ON CLINICAL NEUROSCIENCE AND SOCIETY



A CME-CERTIFIED COURSE

July 22-24, 2011



Biomedical Research Building II/III
University of Pennsylvania
School of Medicine
421 Curie Boulevard
Philadelphia, PA



Course Directors

Anjan Chatterjee, MD, FAAN

Martha J. Farah, PhD



PROGRAM OVERVIEW & TARGET AUDIENCE

Neuroethics is a new field concerned with the wide array of ethical, legal and social issues raised by neuroscience. The field has grown rapidly in the last 5 years, as measured by the number of new conferences, journal articles, books and journals devoted to Neuroethics. Advances in neuroscience are also creating a whole new set of ethical issues related specifically to the clinical neurosciences. Practitioners in neurology, neurosurgery, psychiatry and their pediatric subspecialties, as well as neurorehabilitation, clinical neuropsychology, clinical bioethics, and the myriad of other clinical specialties including nursing, social work and geriatrics grapple with issues of mind and brain. Clinicians schooled in the traditional bioethics of medical practice will find that a host of special issues arise when treating the brain, especially as our understanding of the neural underpinnings of cognitive and affective systems advances. Our goal is to bring together a set of clinically important neuroethical topics, whose pragmatic relevance to the clinician is matched by their intellectual fascination to anyone interested in mind-brain relations.

Learning Objectives

At the conclusion of this program, learners should be able to:

- Discern the appropriate and inappropriate use of imaging in diagnosing neuropsychiatric diseases.
- Identify and correct common misunderstandings on the part of patients and families concerning the use of imaging in neurology and psychiatry.
- Review risks and benefits associated with psychopharmacology and cognitive-behavioral therapy for patients with psychiatric complaints.
- Review typical patient understandings of, and preferences for, medication over talking therapy or the reverse.
- Identify the unique medical and ethical problems that arise when physicians and other healthcare providers develop substance abuse disorders.
- Describe recent advances in transcranial brain stimulation technology and its clinical potential for the treatment of psychiatric and neurological disorders.
- Discuss the subtle and newly uncovered neurological and psychiatric sequelae of minor head injury in sports.
- Describe major recent advances in brain-machine interface technology and its clinical potential for the treatment of perceptual and movement disorders.

Hosting Department

The *Penn Conference on Clinical Neuroscience and Society* is hosted by the Center for Neuroscience & Society at the University of Pennsylvania.



Accreditation

The University of Pennsylvania School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The Department of Psychiatry University of Pennsylvania is approved by the American Psychological Association to sponsor continuing education for psychologists. The Department of Psychiatry University of Pennsylvania maintains responsibility for this program.

Designation of Credit

Physicians: The University of Pennsylvania School of Medicine designates this educational activity for a maximum of 15.25 AMA PRA Category 1 CreditsTM. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Psychologists: The Department of Psychiatry University of Pennsylvania designates this education for a maximum of 14.5 credits.

Disclosures

University of Pennsylvania School of Medicine, Office of Continuing Medical Education, adheres to the ACCME *Standards for Commercial Support*. Faculty disclosure information will be made available in the conference materials and syllabi. Faculty members are also expected to disclose to participants any discussions of off-label and/or investigational uses of pharmaceutical products within their presentations.

Registration Fees

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There will be an optional Conference Banquet on Saturday evening at the Mütter Museum with an after-dinner lecture by Anita Allen, JD, PhD, Henry R. Silverman Professor of Law at Penn and member of the Presidential Commission for the Study of Bioethical Issues. The cost of the banquet is \$60.

Registration forms may be mailed or faxed to the Center for Neuroscience & Society or you may register online at www.neuroethics.upenn.edu/index.php/events/clinical-conference. Please see the bottom of the registration form for contact information. All registrations will be confirmed by email if the necessary form and fee are received by the Center for Neuroscience & Society by July 8, 2011.

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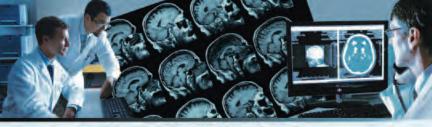
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If you require overnight room reservations, we suggest the Sheraton University City Hotel (215-387-8000) and the Hilton Inn at Penn (215-222-0200).

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Course Directors

Anjan Chatterjee, MD, FAAN Professor of Neurology University of Pennsylvania School of Medicine Philadelphia, PA

Martha J. Farah, PhD Walter H. Annenberg Professor in the Natural Sciences University of Pennsylvania Philadelphia, PA

Guest Faculty

Gerard Gioia, PhD
Director, Neuropsychology
Children's National Medical Center
Associate Professor, Psychiatry
and Behavioral Science, Pediatrics
George Washington University
School of Medicine and
Health Sciences
Washington, DC

Erik Parens, PhD Senior Research Scholar The Hastings Center Garrison, NY

Michael Sachs, PhD Professor of Kinesiology Interim Department Chair Department of Kinesiology College of Health Professions & Social Work Temple University Philadelphia, PA

Keynote Speaker

Michael Chorost, PhD Author of Rebuilt: My Journey Back to the Hearing World and World Wide Mind

Banquet Featured Speaker

Anita Allen, JD, PhD
Presidential Commission for the
Study of Bioethical Issues
Henry R. Silverman Professor of
Law and Professor of Philosophy
University of Pennsylvania
Law School
Philadelphia, PA

Faculty

Geoffrey K. Aguirre, MD, PhD Assistant Professor of Neurology University of Pennsylvania School of Medicine Philadelphia, PA

Robert DeRubeis, PhD
Samuel H. Preston Term Professor in the Social Sciences
Department Chair,
Department of Psychology
University of Pennsylvania
Philadelphia, PA

John A. Detre, MD Professor of Neurology and Radiology Director, Center for Functional Neuroimaging University of Pennsylvania School of Medicine Philadelphia, PA

Roy Hamilton, MD, MS Assistant Professor of Neurology University of Pennsylvania School of Medicine Philadelphia, PA A. Thomas McLellan, PhD Professor of Psychiatry Director, Penn Center for Substance Abuse University of Pennsylvania Philadelphia, PA

Charles P. O'Brien, MD, PhD
Kenneth Appel Professor
Director, Center for Studies
of Addiction
Vice Director, Institute of
Neurological Science of Medicine
Department of Psychiatry
University of Pennsylvania
School of Medicine
Philadelphia, PA



Friday, July 22, 2011

8:00 AM – 9:00 AM Registration & Breakfast

9:00 AM - 9:30 AM **Welcome**

Introduction to Clinical Neuroscience and Society

Martha J. Farah, PhD

BRAIN IMAGING FOR NEUROPSYCHIATRIC DIAGNOSIS: READY FOR PRIME TIME?

9:30 AM – 10:30 AM Science & Technology Lecture

John A. Detre, MD

10:30 AM – 10:45 AM **Q & A**

10:45 AM – 11:05 AM **Break**

11:05 AM – 11:15 AM **Case Study**

11:15 AM – 12:00 PM Ethical, Legal, and Societal Implications

Geoffrey K. Aguirre, MD, PhD

12:00 PM – 12:30 PM **Discussion**

12:30 PM - 1:45 PM Lunch

PSYCHOPHARMACOLOGY AND TALKING CURES: WEIGHING THE BENEFITS FOR PATIENTS AND SOCIETY

1:45 PM - 2:45 PM Science & Technology Lecture

Q & A

Robert DeRubeis, PhD

2:45 PM - 3:00 PM

3:00 PM - 3:20 PM **Break**

3:20 PM - 3:30 PM Case Study

3:30 PM - 4:15 PM Ethical, Legal, and Societal Implications

Erik Parens, PhD

4:15 PM - 4:45 PM **Discussion**

5:00 PM - 6:00 PM Reception

Saturday, July 23, 2011

8:00 AM - 9:00 AM Breakfast

PHYSICIANS AND ADDICTION: WHEN HELPERS NEED HELP

9:00 AM – 10:00 AM Science & Technology Lecture

Charles O'Brien, MD, PhD

10:00 AM - 10:15 AM Q & A

10:15 AM – 10:35 AM **Break**

10:35 AM - 10:45 AM Case Study

10:45 AM – 11:30 AM Ethical, Legal, and Societal Implications

A. Thomas McLellan, PhD

Friday - Sunday July 22-24, 2011

AGENDA

11:30 AM – 12:00 PM **Discussion**

12:00 PM - 1:45 PM Poster Session - Lunch served in presentation area

TRANSCRANIAL BRAIN STIMULATION:

ETHICAL ISSUES IN NONINVASIVE STIMULATION

1:45 PM - 2:45 PM Science & Technology Lecture

Roy Hamilton, MD, MS

2:45 PM - 3:00 PM Q & A

3:00 PM - 3:20 PM Break

3:20 PM - 3:30 PM Case Study

3:30 PM - 4:15 PM Ethical, Legal, and Societal Implications

Anjan Chatterjee, MD

4:15 PM - 4:45 PM **Discussion**

6:00 PM Conference Banquet

Featured Speaker: Anita L. Allen, JD, PhD Neuroethics and Bioethics: A Perspective from a Member of President Obama's Commission for the Study of Bioethical Issues

for the Study of Bioethical Issues College of Physicians of Philadelphia 19 S. 22nd Street, Philadelphia, PA

Sunday, July 24, 2011

8:30 AM - 9:30 AM **Breakfast**

HEAD INJURY IN AMATEUR ATHLETES: WHEN SPORTS AND PUBLIC HEALTH COLLIDE

9:30 AM – 10:30 AM Science & Technology Lecture

Gerard A. Gioia, PhD

10:30 AM - 10:45 AM **Q & A**

10:45 AM - 11:05 AM **Break**

11:05 AM - 11:15 AM Case Study

11:15 AM – 12:00 PM Ethical, Legal, and Societal Implications

Michael Sachs, PhD

12:00 PM – 12:30 PM **Discussion**

KEYNOTE CLOSING LECTURE

12:45 PM - 1:30 PM **Cyborg Citizens:**

Brain-Machine Interfaces Come of Age

Michael Chorost, PhD

1:30 PM Evaluation and Adjournment

CME Registration Form

PENN CONFERENCE ON CLINICAL NEUROSCIENCE AND SOCIETY

Please print or type

Friday – Sunday July 22-24, 2011

You may also register online at www.neuroethics.upenn.edu/index.php/events/clinical-conference

Name (First)	ne (First) (Last)					
Academic Degree						
Medical Specialty						
Affiliation (Hospital, C	Office, or Company)					
Address (Affiliation	or 🗆 Home)					
City	State		Zip			
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E-mail						
Registration Fee (p	re-payment is re	quired to be off	icially register	red)		
Industry R □ \$349 – All Penn Facul □ \$99 – Stud	vsicians, Psycholo epresentatives ied Health Profe ty and Staff	ssionals, Reside	ents and Fellov	ws,		
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Center for Neuroscience & Society University of Pennsylvania 3720 Walnut Street, Philadelphia, PA 19104-6241 Phone: 215-573-8534 | Fax: 215-898-1982 conference@neuroethics.upenn.edu

Please Note: Walk-in registrants must bring payment to the program. Seating may be limited for walk-in registrants.



3720 Walnut Street Philadelphia, Pennsylvania 19104-6241

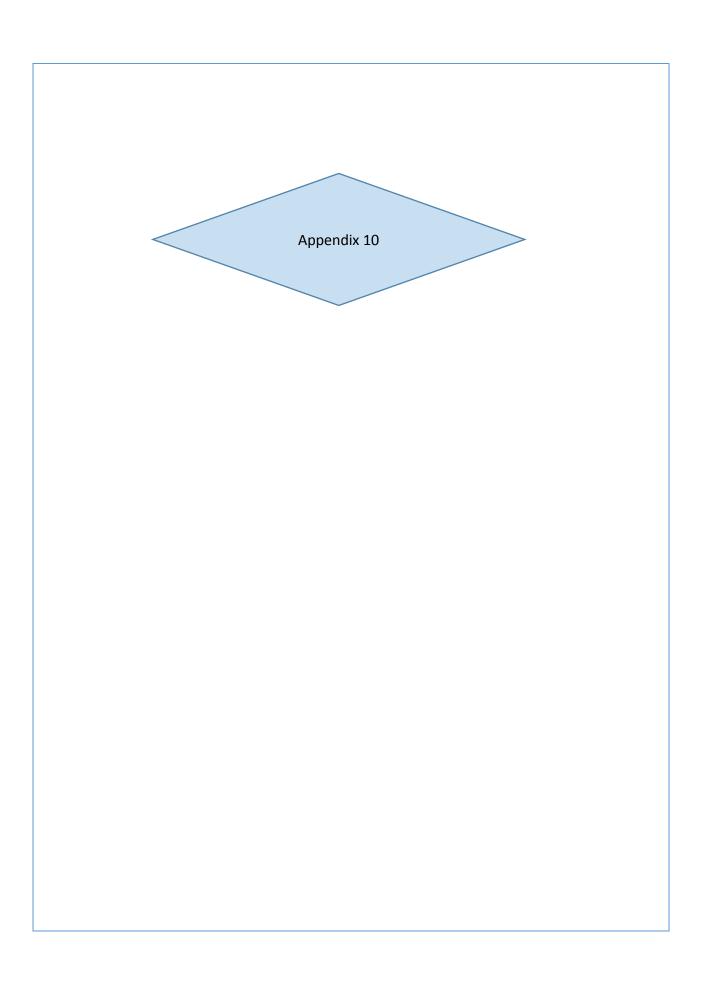
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A CME-CERTIFIED COURSE

Friday - Sunday, July 22-24, 2011

Biomedical Research Building II/III
University of Pennsylvania School of Medicine
421 Curie Boulevard
Philadelphia, PA 19104





May 29 - June 8, 2012

University of Pennsylvania Fellowships in Neuroscience & Society



May 29, 2012

Dear Fellows,

Welcome to the CNS Fellowship Program in Neuroscience & Society!

My colleagues and I are thrilled to have such an accomplished group of fellows, and we look forward to working with you over the next two weeks.

The fellowship program has been made possible by the generous support of the National Science Foundation and the Office of the Provost, University of Pennsylvania. Our sincere thanks go out to them.

Sincerely,

Motha

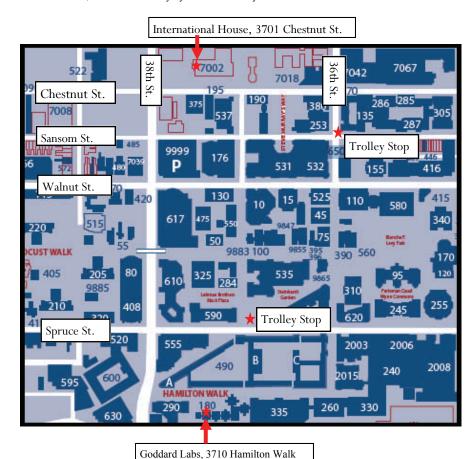
Martha J. Farah, Ph.D.

Director, Center for Neuroscience & Society

Information: Places and Phone Numbers

The map below shows the locations of International House, where you are staying, and Goddard Labs, where most of the lectures will be held. It takes approximately 10 minutes to walk between the two locations. The phone number for International House is (215) 387-5125. For any fellowship-related questions, feel free to contact Program Coordinator Sara Strickland at (215) 573-8534 (office) or (513)376-2711 (cell).

Public Transportation: Downtown Philadelphia is easily accessible via SEPTA (www.septa.org). Take the #21 bus, which runs down Chestnut St., or any trolley headed eastbound from either of the stations marked on the map (note: stations are underground). SEPTA fare is \$2.00 cash per ride, or tokens may be purchased for \$1.55 each on the 2nd floor of the Penn bookstore (36th and Walnut Sts.). Unfortunately, you cannot buy tokens at most SEPTA stations.



2012 Penn Fellowships in Neuroscience & Society		
Wed 5/29		
PM		
5:00-6:00	Reception, City Tap House (3925 Walnut St.)	
6:00-8:00	Dinner, City Tap House	
Thurs 5/30		
AM	<u>Introduction</u>	
8:30-9:00	Breakfast	
9:00-9:30	Student Introductions	
10:30-11:30	Overview of Fellowship; Introduction to Neuroscience &	
	Society (w. break) (M. Farah)	
11:30-12:00	Seminar Presentations: Topic Proposals	
12:00-12:15	Goddard Tour	
12:15-1:30	Lunch: See Food Truck Guide	
PM	Ethics, Bioethics	
1:30-2:30	Introduction to Philosophical Ethics (J. Moreno)	
2:30-3:30	Intro to Research Ethics – Animal and Human Subjects	
	(J. Moreno)	
3:30-3:45	Break	
3:45-5:00	IRB Case Discussions (J. Jaeger)	
5:00-5:15	Wrap-Up (J. Jaeger & M. Farah)	
Thurs, 5/31		
AM		
8:30-9:00	Breakfast & Pick Up Seminar Presentation Feedback	
9:00-10:30	Seminar Presentation Outlining	
10:30-10:45	Break	
10:45-12:15	N.O.E.R. Lecture, Q&A: Imaging (G. Aguirre)	

12:15-1:30	Lunch
PM	<u>Imaging</u>
1:30-2:30	Visit to Scanner (M. Korczykowski)
2:30-3:15	Incidental Findings (J. Detre)
3:15-4:00	Decision Neuroscience and Commercial Applications
	(H. Plassmann)
4:00-4:15	Break
4:15-5:15	Intuitions about Images (A. Roskies)

Fri 6/1		
AM	D 10 .	
8:30-9:00	Breakfast	
9:00-10:45	Seminar Presentation Prep Time (M. Farah office hours)	
10:45-11:00	Break	
11:00-12:15	N.O.E.R. Lecture: Science Communication	
	(S. Williams)	
12:15-1:15	Lunch with Penn Neuroscience Graduate Students	
PM	<u>Communication</u>	
1:30-5:00	Communicating Science Workshop (S. Williams)	
5:00-5:15	Week One Wrap-up	
WEEKEND		
Mon 6/4		
AM		
8:30-9:00	Breakfast	
9:00-11:00	Seminar run-throughs in groups of three	
11:00-11:15	Break	
11:15-12:15	N.O.E.R. Lecture: Criminal Brains (A. Raine)	
12:15-1:30	Group Photo and Lunch	
PM	<u>Law</u>	
1:30-2:15	Lie Detection (M. Farah)	
2:15-3:15	Overview of Responsibility and Brain Functions	
	(S. Morse)	
3:15-3:30	Break	
3:30-4:30	Mock Expert Testimony (S. Rushing, S. Bibas,	
	D. Rudovsky, S. Morse)	
4:30-5:15	Post-Game Analysis	
Tues 6/5		
AM		
8:30-9:00	Breakfast	
9:00-10:45	Seminar Presentation Prep Time	
10:45-11:00	Break	
11:00-11:45	N.O.E.R. Lecture & Q&A: TMS/tDCS (R. Hamilton)	
11:45-12:15	TSN Video on Conflict of Interest (B. Golomb)	
12:15-1:30	Lunch Guest - Daniel Langleben	

Fri 6/8	
AM	
8:30-9:00	Breakfast
9:00-9:45	(w. discussion) Seminar Presentation #9
9:45-10:30	(w. discussion) Seminar Presentation #10
10:30-10:45	Break
10:45-11:30	(w. discussion) Seminar Presentation #11
11:30-12:15	(w. discussion) Seminar Presentation #12
12:15-1:30	Lunch
PM	Neuroscience & Society
1:30-2:30	Presidential Committee: Neuroethics (A. Allen)
2:30-2:45	Break
2:45-3:45	Program Debrief & Evaluation
5:00-6:00 6:00-8:00	Reception at City Tap House (3925 Walnut St.) Dinner at City Tap House
0.00-0.00	Diffici at Oity Tap House

Speakers

Geoffrey K. Aguirre, MD, PhD, Assistant Professor of Neurobiology, Perelman School of Medicine at the University of Pennsylvania; Associate Director, Penn Center for Neuroscience & Society

Dr. Aguirre is both a Neurologist and a Cognitive Neuroscientist whose clinical and research work concerns the organization of the brain for mental operations, in particular the loss and recovery of visual ability. Using functional MRI he studies how neurons are normally arranged to represent and store the appearance of people, places, and things. Dr. Aguirre uses these techniques to understand how blindness changes the brain and how the brain adapts to the recovery of vision. As a clinician, he treats patients with a variety of disturbances of thinking and memory, with his practice informed by recent insights into the organization of the brain for these functions.

Anita L. Allen, JD, PhD, Henry R. Silverman Professor of Law and Professor of Philosophy, University of Pennsylvania Law School

Anita L. Allen is an expert on privacy and confidentiality law, general bioethics, and contemporary values, and is recognized for her scholarship about legal philosophy, women's rights, and race relations. She serves as a member of the Presidential Commission for the Study of Bioethical Issues. Dr. Allen has a special interest in the law and ethics of human reproduction, genetic privacy, mental health ethics, the right to die, informed consent, malpractice law and human subject research. Her books include *Unpopular Privacy: What Must We Hide?*; *Privacy Law and Society; The New Ethics: A Guided Tour of the 21st Century Moral Landscape; Why Privacy Isn't Everything: Feminist Reflections on Personal Accountability;* and *Uneasy Access: Privacy for Women in a Free Society.*

Stephanos Bibas, JD, MA, Professor of Law and Criminology, University of Pennsylvania Law School

Stephanos Bibas studies the powers and incentives that shape how prosecutors, defense counsel, defendants, and judges behave in the real world of guilty pleas. He also studies the divorce between criminal procedure's focus on efficiency and criminal law's interest in healing victims, defendants, and communities. His new book (*The Machinery of Criminal Justice*, Oxford 2012)

explains how criminal justice should do more to encourage acceptance of responsibility, remorse, apology, and forgiveness. As director of Penn's Supreme Court Clinic, Stephanos Bibas litigates a wide range of Supreme Court cases.

Anjan Chatterjee, MD, Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania

Dr. Anjan Chatterjee is a practicing neurologist and Professor in the Department of Neurology and Center for Cognitive Neuroscience at the University of Pennsylvania. His research focuses on human cognition, especially language, aesthetics, and visual-spatial cognition. In his 2004 *Neurology* article on "cosmetic neurology" he sounded the first call for physicians to consider the ethics of brain enhancement, and has continued as a leader on the clinical side of neuroethics. Dr. Chatterjee is a member of the Committee on Ethics, Law and Humanities Committee of the American Academy of Neurology, and has served as CME Course Director for the Center for the Penn Center for Neuroscience & Society.

Jayatri Das, PhD, Senior Exhibit and Program Developer, The Franklin Institute, Philadelphia

Dr. Das is currently leading the development of "Your Brain," an exhibit about neuroscience and psychology of the human brain scheduled to open in 2014, as well as The Franklin Institute's programming initiatives to advance informal science education about materials science and nanotechnology around the nation. She writes about research in "Biology for Nonscientists" through the Howard Hughes Medical Institute's "Ask a Scientist" website and is a Fellow of the CNS.

Robert DeRubeis, PhD, Samuel H. Preston Term Professor in the Social Sciences; Psychology Department Chair, University of Pennsylvania

Dr. DeRubeis researches the nature of depression, the effectiveness of treatments for it, and the reasons treatments are effective. His particular focus is on the role that conscious beliefs play both in the maintenance of depression and in its reduction. Dr. DeRubeis has conducted research concerning how people with depression can be helped to gain control over their thinking using a treatment approach called cognitive therapy.

John Detre, MD, Professor of Neurology and Radiology, Perelman School of Medicine at the University of Pennsylvania

Dr. Detre's research focuses on gathering images of brain function using magnetic resonance and other physiological imaging modalities. He is widely known for his expertise in clinical fMRI and for seminal work in the development of a noninvasive quantitative perfusion method utilizing arterial spin labeled (ASL) blood water as a diffusible tracer for flow quantification. Dr. Detre's research has focused on neuroimaging methods, development and validation, the physiology of functional activation, and applications in stroke, epilepsy, recovery of function, neuropsychiatric disorders, and cognitive neuroscience.

Martha J. Farah, PhD, Director, Penn Center for Neuroscience & Society; Walter H. Annenberg Professor of Natural Sciences, Department of Psychology, University of Pennsylvania; Founding Director of Penn's Center for Cognitive Neuroscience

Dr. Farah is a cognitive neuroscientist who works on problems at the interface of neuroscience and society. She researches the effects of childhood poverty on brain development, the expanding use of neuropsychiatric medications by healthy people for brain enhancement, novel uses of brain imaging, and the many ways in which neuroscience is changing the way we think of ourselves as physical, mental, moral and spiritual beings. She has published over 150 peer-reviewed journal articles and six books, including *Neuroethics: An Introduction with Readings* published by MIT Press.

Steven J. Fluharty, PhD, Senior Vice Provost for Research at the University of Pennsylvania

Dr. Fluharty is responsible for the University's research practices, including oversight of campus-wide research planning efforts, linkages between the University and industry, and the transfer of technologies from University laboratories to the public sector. He is also a Professor of Pharmacology, Psychology and Neuroscience in the Schools of Veterinary Medicine, Arts and Sciences, and Medicine. Dr. Fluharty has received numerous awards and honors for his research including the Louis Flexner Prize in Neuroscience, the Beecham Award for Research Excellence, and in 1996, he was designated an Astra Merck Scholar by the American Heart Association.

Seth J. Gillihan, PhD, Clinical Psychologist for the Department of Psychiatry, Perelman School of Medicine at the University of Pennsylvania

Dr. Gillihan's research interests include the neural, genetic, and behavioral correlates of depression risk, the assessment and treatment of posttraumatic stress disorder (PTSD), and conceptual issues related to psychiatric diagnosis and neuroimaging. He currently is Co-Investigator on an NIH-funded research study to examine whether adding effective PTSD treatment to smoking cessation medication improves smoking outcomes among cigarette smokers with comorbid PTSD. Dr. Gillihan teaches regularly on cognitive-behavioral therapy for anxiety disorders and on the neural substrates of depression and anxiety.

Roy Hamilton, MD, MS, Assistant Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania; Director of the Penn Laboratory for Cognition and Neural Stimulation

Dr. Hamilton's research interest is in the characteristics and limits of functional plasticity in the adult human brain; how the brain reorganizes itself in response to injury, and whether it is possible to enhance the brain's potential for reorganization in order to speed rehabilitation. His studies use a technology known as transcranial magnetic stimulation (TMS) to examine and manipulate the functional anatomy and connectivity of the brain in both healthy and injured states. Dr. Hamilton is also director of the University of Pennsylvania School of Medicine Pipeline Program, a multi-tiered neuroscience education program for inner-city high school students in Philadelphia.

Jan Jaeger, RN, PhD, Director, IRB Operations, Harvard University

Dr. Jan Jaeger is a medical sociologist who is currently serving as the Director of Institution Review Board Operations for the Faculty of Arts and Sciences at Harvard University. Jan received her B.A. in Heath Care Management from the Wharton School, a Masters degree in Biomedical Ethics from the University of Pennsylvania and a Ph.D. in Sociology, also from Penn. She has taught sociology and bioethics at Penn and carried out research on human subjects research and IRBs.

Marc Korczykowski, Researcher, Center for Functional Neuroimaging, University of Pennsylvania

Marc Korczykowski has worked in the Penn Center for Functional Neuroimaging for eight years, and trained in clinical neuropsychology and biomedical engineering the University of Pennsylvania School of Engineering & Applied Sciences. He has co-authored over 25 publications in cognitive and applied neuroscience, but prefers to be known as "just the photographer."

Daniel Langleben, MD, Associate Professor of Psychology at the Veteran's Administration Medical Center, Perelman School of Medicine at the University of Pennsylvania

Dr. Langleben studies the neural correlates of deception, drug craving, and the effects of advertising, as well as the social and ethical issues raised by our growing ability to image these processes. He researches the use of magnetic resonance to discover deception in parts of the brain. By studying fMRI pictures Dr. Langleben came to conclusion that lying increases blow flow in key areas of the brain, sparking much conversation toward the ethical implications.

Jonathan D. Moreno, PhD, David and Lyn Silfen University Professor Ethics, Professor of Philosophy, Penn Center for Bioethics

Dr. Moreno is an elected member of the Institute of Medicine/National Academy of Sciences and is a National Associate of the National Research Council. He has served as a senior staff member for three presidential advisory commissions, and has given invited testimony for both houses of congress. He is a member of the Governing Board of the International Neuroethics Society, a Faculty Affiliate of the Kennedy Institute of Ethics at Georgetown University, a Fellow of the Hastings Center and the New York Academy of Medicine, and a past president of the American Society for Bioethics and Humanities.

Stephen Morse, JD, PhD, Ferdinand Wakeman Hubbell Professor of Law, Professor of Psychology and Law in Psychiatry, University of Pennsylvania Law School; Associate Director of the Penn Center for Neuroscience and Society

Dr. Morse is a renowned expert in criminal and mental health law, whose

work emphasizes individual responsibility in criminal and civil law. He works on problems of legal and moral responsibility and their compatibility with the materialist worldview of neuroscience. Dr. Morse is interested in the roles of neuroscience and behavioral science in explaining and excusing antisocial and criminal behavior. He is currently Co-Director of the MacArthur Foundation Project on Law and Neuroscience.

Hilke Plassmann, PhD, Assistant Professor of Marketing, INSEAD

Dr. Plassmann is currently a Visiting Professor at Wharton's OPIM department and NYU's Marketing Department. Dr. Plassmann is Assistant Professor of Marketing at INSEAD, where she has founded a Decision Neuroscience Group since she started in September 2008. She is an affiliated faculty member at the Cognitive Neuroscience Laboratory INSERM U960 of the École Normale Supérieure, and the École des Neurosciences de Paris-Île-de-France. Dr. Plassmann's primary research areas are decision-making in the intersection of neuroscience and behavioral decision-making.

Joe Powers, PhD, MBA, Managing Director, Office of the Vice Provost for Research, University of Pennsylvania; Executive Director, Penn Center for Neuroscience and Society

Dr. Powers is Managing Director, Neuroscience Initiatives, in the Office of the Vice Provost for Research, where he has responsibility consulting on Penn's overarching strategy for neuroscience research and education. Prior to his career in academia, he spent nearly a decade in a variety of business, strategy, and marketing roles within the pharmaceutical industry, where he has developed an expertise in product launches.

Adina Roskies, PhD, Associate Professor of Philosophy, Dartmouth College

Dr. Roskies' philosophical research interests lie at the intersection of philosophy and neuroscience, and include philosophy of mind, philosophy of science, and ethics. She was a member of the McDonnell Project in Neurophilosophy, a working group aiming to integrate philosophical thought with neurobiological research. She has published many articles in both philosophy and the neurosciences, among which are several devoted to exploring and articulating issues in neuroethics.

David Rudovsky, LLB, Senior Fellow, University of Pennsylvania Law School

David Rudovsky, one of the nation's leading civil rights and criminal defense attorneys, practices public interest law with the firm of Kairys, Rudovsky, Messing & Feinberg. He became a Senior Fellow at Penn Law in 1988 and teaches courses in Criminal Law, Constitutional Criminal Procedure and Evidence. His awards include a MacArthur Foundation Fellowship and Award for Accomplishments in Civil Rights Law and Criminal Justice, the ACLU Civil Liberties Award, and most recently his fifth Harvey Levin Award for Excellence in Teaching at the Law School.

Susan E. Rushing, MD, JD, Assistant Professor, Department of Psychiatry, Perelman School of Medicine

Dr. Rushing is an attending psychiatrist for the Hospital of the University of Pennsylvania Psychiatric Emergency Evaluation Center and Psychiatry Consult-Liaison Service and for the Penn Behavioral Health Forensic Psychiatry Service. She is actively involved in resident and medical student education at the University of Pennsylvania Perelman School of Medicine and in Penn's psychiatry residency programs as the course director for Forensic Psychiatry. She lectures on topics of law and medicine around the country with a focus in decision making capacity, surrogate decision maker laws, criminal law, and mental illness.

Sheryl Williams, Principal, J Fox Enterprises LLC Management Consultants

Ms. Williams is an independent consultant who has spent her career primarily in the health care industry working for the nonprofit Alzheimer's Association and publically traded corporations. In her last corporate position she was Vice President for Corporate & Public Affairs reporting to the CEO of a global biopharmaceutical company. As a leader in the communications function, she served as a corporate spokesperson and trained many executives to present their ideas to stakeholders as diverse as investors & analysts, employees, regulators and the media. Sheryl is currently a candidate for a MS in Organizational Dynamics at the University of Pennsylvania, and is a Fellow of the CNS.

Staff

Denise Clegg, MAPP, Director of Programs and Operations, Penn Center for Neuroscience and Society

Denise Clegg more than fifteen years executive management experience with expertise in organizational and funding development. Her work has focused on advancing policies, programs, and research with a positive social impact in the not-for-profit and academic sectors. Prior to joining the CNS, Denise launched and directed the Positive Neuroscience Project at the University of Pennsylvania. She is also a mindfulness meditation facilitator with the Penn Program for Mindfulness and teaches an undergraduate preceptorial on "Meditation and the Brain: Science and Experience."

Sara Strickland, Program Coordinator, Penn Center for Neuroscience and Society

Sara Strickland came to the Center for Neuroscience and Society from the Free Library of Philadelphia, where she managed the *One Book, One Philadelphia* literacy program. Her career has been focused on building capacity for nonprofits through strategic partnerships around development, marketing, and public programming. At CNS, Sara works to further the center's mission through coordination of events and educational opportunities for scholars, faculty, and professionals in affiliated fields.

The Penn Center for Neuroscience and Society would also like to thank Program Assistant **Charlotte Pope** and intern **Addison Hoffman** for their invaluable assistance in preparing for this program.

2012 Fellows

Audrey Chen, University of California at Los Angeles

Audrey Chen's research examines communication between monoaminergic neurons at the circuit level and at the synapse. Her work utilizes Drosophila genetics to examine how monoamines, such as dopamine and serotonin, work in concert with one another to coordinate behavior. At the synapse, she uses fast-capture, in vivo, real-time imaging to examine the trafficking of vesicular monoamine transporters, which regulate amine storage and release. Within the field of neuroethics, Audrey is interested in the neurological foundations of moral cognition. Her interests range from neurological determinism to methods of distinguishing states of consciousness and neurological predictors of criminal offenses.

Steve Fleming, New York University

Steve Fleming is a postdoc in cognitive neuroscience supported by a Sir Henry Wellcome Fellowship. He studied psychology at Oxford before moving to London in 2006 to complete his PhD at UCL at the Center for Neuroimaging. His is now studying how the brain perceives the outside world, decides what to do, and generates the right actions. In particular, he's interested in connecting formal models of decision-making (including signal detection theoretic and neuroeconomic approaches) to self-awareness. In collaboration with Nathaniel Daw and Larry Maloney at NYU, he uses computational models to understand the neural mechanisms underlying metacognitive distortions.

Drew Halley, University of California at Berkeley

Drew Halley is currently a third-year doctoral student in Biological Anthropology at UC Berkeley, studying brain evolution with Terrence Deacon. During his undergraduate work at Penn State, he primarily studied the evolution of neurotransmitter receptor polymorphisms and their relation to human sexual behavior, working with population geneticist Mark Shriver. Drew also worked at a residential setting for mental health, facilitated race relations dialogues between students, and ran a sensory deprivation "float" tank laboratory. He is currently researching the evolution of developmental pathways that produce primate and human brains, particularly with respect to encephalization.

Lia Min, Harvard University

Lia Min is a graduate student at Harvard University Program in Neuroscience working under the supervision of Professor Michela Fagiolini. Her current research looks at how the development of cortical areas is influenced by sensory experience. In collaboration with Takao Hensch's lab, Lia discovered that the visual cortex of visually deprived mice is multimodal. She investigated whether this multimodality is a form of arrested or abnormal development, and what the underlying neural mechanism is using anatomical and molecular techniques. Before studying Neuroscience, She has been trained as an artist. It is her interest to explore the human mind through interdisciplinary studies.

Joseph O'Doherty, W.M. Keck Foundation Center

Joseph O'Doherty received the BS in physics from East Carolina University in 2001 and the PhD in biomedical engineering from Duke University in 2011. He is currently a Postdoctoral Scholar at the W.M. Keck Foundation Center for Integrative Neuroscience, in San Francisco, CA. He has held a previous research appointment at the Duke University Center for Neuroengineering. His research interests include methods for providing artificial somatic sensation and proprioception for neural prostheses.

Maya Opendak, Princeton University

Maya Opendak's primary research interest is in the cellular and molecular basis of memory. During undergrad at Columbia, she worked in Peter Balsam's Adaptive Behavior lab and completed a senior thesis concerning temporal memory in humans. In the summer of 2009, Maya worked with Joe LeDoux at NYU on a project concerning the effects of desipramine (an SNRI) on auditory fear conditioning in rats as part of an NSF-REU. As a member of Elizabeth Gould's lab at Princeton, she studies the contribution of adult neurogenesis and oxytocin to memory for socially relevant information in a rat dominance hierarchy.

David Pagliaccio, Washington University in St. Louis

David Pagliaccio received his undergraduate degree from Brown University where he majored in neuroscience and psychology. While there, his main research pursuits used human neuroimaging to explore how task-relevant information is represented in prefrontal cortex. David is currently working on his

Ph.D. in neuroscience at Washington University in St. Louis. His graduate work aims to investigate structural brain changes and alterations in emotional processing in children with preschool-onset major depression using functional magnetic resonance imaging.

Sarah Rhodes, National Institute of Mental Health

Sarah Rhodes is a postdoctoral Research Fellow at the National Institute of Mental Health (NIMH), conducting research into the neural underpinnings of reward based learning and behavior. Her primary focus is on teasing apart the brain regions underlying the capacity for goal-directed behavior, which is disrupted in a range of neuropsychological disorders. A transplant from the UK, she holds a MA in Natural Science from Cambridge University, and a PhD in Behavioral Neuroscience from Cardiff University. Sarah is a Fellow of the Institute on Science for Global Policy, and is currently on a second policy detail at the Office of Autism Research Coordination, NIMH.

Samuel Sakhai, University of California at Berkeley

Samuel Sakhai is a fourth-year doctoral student in the Behavioral Neuroscience program at UC Berkeley. After transferring from Pierce College in Los Angeles, where he lobbied for easier access to higher education, he received his BA from Berkeley in 2007. His research focuses on sensitive periods during early life and the ways in which early environmental variables can program both stress physiology and other critical neural systems important in regulating reward, motivation, and decision-making. Samuel is particularly interested in determine to what degree it is possible to change what may already biologically and behaviorally engrained by early life, as well as the consequences of developmental programming for society, public health, and law.

Julie Spicer, Columbia University Medical Center

Julie Spicer is a postdoctoral research fellow in the Division of Behavioral Medicine at Columbia University Medical Center. She received her Ph.D. in psychology in 2011 at Columbia University where she utilized fMRI to investigate brain activation associated with short-term psychosocial stress. Currently, she is investigating the effects of a chronic stressor, low socioeconomic status (SES), on brain, parenting behavior and health. The research aims to lay the groundwork for interventions for better parenting in the future, but not to

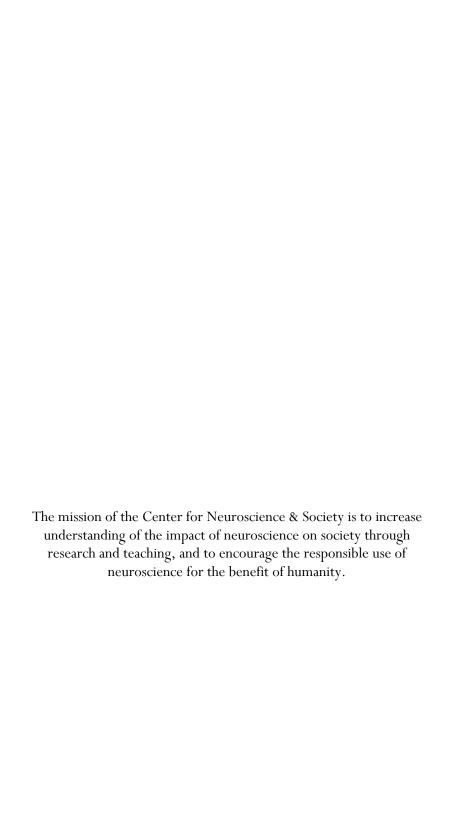
engender the idea that SES determines any one outcome. She is interested in the ethical and societal implications of this work.

Joseph Taylor, Medical University of South Carolina

Joseph Taylor is a rising 6th year MD/PhD student at the Medical University of South Carolina (MUSC). Prior to MUSC, his research focused on in vivo rodent neurophysiological studies of learning and memory (Davidson College) and movement disorders (NINDS). Joseph is currently conducting his dissertation research in the Brain Stimulation Laboratory under the direction of Mark George, MD. He is using transcranial magnetic stimulation (TMS) and fMRI to investigate the neural circuitry of pain processing. More broadly, he is interested in using invasive and non-invasive brain stimulation to understand neural circuitry and treat neuropsychiatric disorders.

Qing Yang, Yale School of Medicine

Qing Yang is a 6th year MD/PhD student at Yale School of Medicine. Her PhD thesis research focuses on the cell biology of axon guidance. By understanding how signaling pathways alter cytoskeleton dynamics in neurons, she hopes to discover new ways to encourage correct targeting and promote regeneration. Her findings have been accepted for publication in the Journal of Cell Biology. After graduation, Qing plans to pursue a career in pediatric neurology. As a physician scientist, she is interested in the societal and human impact of neuroscience, particularly the ethical questions surrounding brain development, maturation, consciousness, and brain death.



FELLOWSHIPS IN NEUROSCIENCE & SOCIETY

UNIVERSITY OF PENNSYLVANIA JUNE 24TH-29TH



FROM THE DIRECTOR

June 24, 2013

Dear Fellows.

Welcome to the CNS Fellowship in Neuroscience & Society on Teaching Neuroethics!

My colleagues and I are thrilled to have such an accomplished group of fellows, and we look forward to working with you over the next week.

The fellowship program has been made possible due to the generous support of the National Science Foundation and the Office of the Provost, University of Pennsylvania. Our sincere thanks go out to them.

Sincerely,

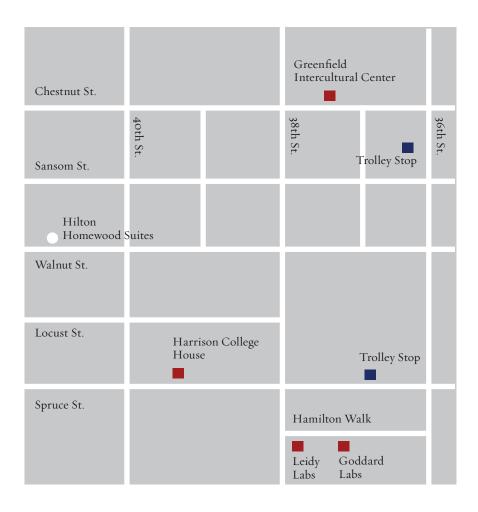
Martha J. Farah, Ph.D.

Matha

Director, Center for Neuroscience & Society

neuroethics.upenn.edu

PLACES & PHONE NUMBERS



The map above shows the location of Hilton Homewood Suites, which is both where you are housed and the site of most lectures. It also features Goddard and Leidy Labs, where lectures will be held on June 27th. The walk between Goddard and the hotel is approximately 15 minutes. The hotel offers a complimentary shuttle service; but it must be reserved at the front desk in advance.

Fellowship Inquiries: Contact Sara Strickland at any time at 215.573.8534 (office); 513.376.2711 (cell), or via email at sstrickland@neuroethics.upenn.edu.

SCHEDULE

Monday June 24th 5-8pm Welcome Reception and Dinner

(Greenfield Intercultural Center,

3708 Chestnut St.)

Tuesday June 25th INTRODUCTION

7-9am Breakfast (in hotel dining room)

9-9:30am Introductions

9:30-10:45am Fellowship Overview; Introduction to

Neuroscience & Society (M. Farah)

10:45-11am Break

11-12:15pm Basic Philosophical & Applied Ethics I (A. Fiester)

12:15-1:30pm Lunch (on your own, see dining guide)

ETHICS & APPLIED ETHICS

1:30-2:30pm Philosophical & Applied Ethics II (A. Fiester)

2:30-2:45pm Break

2:45-5:30pm Neural Bases of Utilitarian & Deontological

Processes (F. Cushman)

Wednesday June 26th

IMAGING

7-9am Breakfast

9-11am Imaging (G. Aguirre)

11-11:15am Break

11:15am-12:15pm Neuromarketing (J. Kable)

12:15-1:30pm Lunch

NEUROLAW

1:30-2pm Introduction to Neurolaw (M. Farah)
2-2:30pm fMRI Lie Detection (M. Farah)

2:30-3:15pm Announcements

3:15-3:30pm Break

3:30-5pm Mock Expert Testimony Video; Q&A

SCHEDULE

Thursday June 27th

ENHANCEMENT I (IN RICHARDS-GODDARD COMPLEX)

7-9am Breakfast

9-10:45am Cognitive Enhancement (M. Farah)

(Richards Library, 5th fl. Goddard Labs, 3710

Hamilton Walk)

10:45-11am Break

11-12:15pm Cognitive Enhancement by Brain Stimulation

(R. Hamilton)

12:15-1:30pm Lunch in Goddard Labs/

TMS Open Lab (O. Faseyitan, Goddard 314)

ENHANCEMENT II (LEIDY LABS 109, 3740 HAMILTON WALK)

1:30-2:30pm Enhancement from a Physician's Point of View

(A. Chatterjee)

2:30-2:45pm Break

2:45-4:30pm Medication of Sadness, CBT, & Pharmacology

(R. DeRubeis)

4:30pm Beer Hour! (Richards Library)

Friday June 28th

ETHICAL CHALLENGES IN PSYCHIATRY & NEUROLOGY

7-9am Breakfast

9-10am War & the Brain (S. Gillihan)

10-10:15am Break

10:15-10:30am Group Photo

10:30-12:15pm The Aging Brain & Predictive Testing for

Alzheimer's Disease (D. Wolk)

12:15-1:30pm Lunch

1:30-3:30pm Disorders of Consciousness (J. Fins)

3:30-3:45pm Break

3:45-5pm Psychiatric Diagnosis: Societal & Ethical Issues

(M. Farah)

SCHEDULE

Saturday June 29th

TEACHING NEUROETHICS I

7-9am Breakfast

9-10:30am Participant Round Table in Teaching Neuroethics

10:30-10:45am Break

10:45-12:15pm Teaching & Learning Part I (B. Lenthall)

12:15-1:30pm Lunch

TEACHING NEUROETHICS II & WRAP-UP

1:30-3pm Teaching & Learning Part II (B. Lenthall)

3-3:15pm Break

3:15-4:30pm Evaluation, Debriefing, & Wrap-up

4:30-6pm Break

6-9pm Final Reception & Dinner

(Rooftop Lounge, Harrison College House,

39th & Spruce Sts.)

Geoffrey K. Aguirre, MD, PhD, Associate Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania; Associate Director, Penn Center for Neuroscience & Society

Dr. Aguirre is both a neurologist and a cognitive neuroscientist whose clinical and research work concerns the organization of the brain for mental operations, in particular the loss and recovery of visual ability. Using fMRI he studies how neurons are normally arranged to represent and store the appearance of people, places, and things. Dr. Aguirre uses these techniques to understand how blindness changes the brain and how the brain adapts to the recovery of vision. As a clinician, he treats patients with a variety of disturbances of thinking and memory, with his practice informed by recent insights into the organization of the brain for these functions.

Anjan Chatterjee, MD, Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania

Dr. Anjan Chatterjee is a practicing neurologist and professor in the Department of Neurology and Center for Cognitive Neuroscience at the University of Pennsylvania. His research focuses on human cognition, especially language, aesthetics, and visual-spatial cognition. In his 2004 Neurology article on "cosmetic neurology" he sounded the first call for physicians to consider the ethics of brain enhancement, and has continued as a leader on the clinical side of neuroethics. Dr. Chatterjee has served as a member of the Committee on Ethics, Law and Humanities Committee of the American Academy of Neurology, and as CME Course Director for the Center for the Penn Center for Neuroscience & Society. At present, he is the President of the Behavioral and Cognitive Neurology Society, and co-editor of *Neuroethics in Practice* with Martha Farah.

Fiery Cushman, PhD, Assistant Professor in the Department of Cognitive, Linguistic and Psychological Sciences at Brown University

Dr. Cushman investigates the cognitive mechanisms responsible for human moral judgment, along with their development, evolutionary history and neural basis. His work often draws from classic philosophical dilemmas, and has focused in particular on the psychology of punishment and the aversion

to harmful action. He received his BA and PhD from Harvard University, where he also completed a post-doctoral fellowship.

Robert DeRubeis, PhD, Samuel H. Preston Term Professor in the Social Sciences; Psychology Department Chair, University of Pennsylvania

Dr. DeRubeis researches the nature of depression, the effectiveness of treatments for it, and the reasons treatments are effective. His particular focus is on the role of conscious beliefs both in the maintenance and reduction of depression. Dr. DeRubeis has conducted research concerning how cognitive therapy can be used to treat people with depression by helping them to gain control over their thinking.

Martha J. Farah, PhD, Director, Penn Center for Neuroscience & Society; Walter H. Annenberg Professor of Natural Sciences, Department of Psychology, University of Pennsylvania

Dr. Farah is a cognitive neuroscientist who works on problems at the interface of neuroscience and society. She studies the effects of childhood poverty on brain development, the expanding use of neuropsychiatric medications by healthy people for brain enhancement, novel uses of brain imaging, and the many ways in which neuroscience is changing the way we think of ourselves as physical, mental, moral and spiritual beings. She has published over 150 peer-reviewed journal articles and seven books, including *Neuroethics: An Introduction with Readings* and *Neuroethics in Practice*, co-edited with Anjan Chatterjee.

Autumn Fiester, PhD, Director of Education; Director, Penn Clinical Ethics Mediation Program; Co-Director, Project on Bioethics, Sexuality & Gender Identity

Dr. Fiester is the Director of Education in the Department of Medical Ethics and Health Policy at the Perelman School of Medicine at the University of Pennsylvania. She is the Director of the Penn Clinical Ethics Mediation Program, which promotes clinical ethics mediation as a conflict-resolution method in both formal clinical ethics consultations and ethics conflicts at the bedside. Dr. Fiester is a consultant and mediator for the Hospital of the

University of Pennsylvania Ethics Service. She is also the Co-Director of the newly launched Bioethics, Sexuality, and Gender Identity Project that seeks to demarcate a sub-field within bioethics that focuses on the intersection of LGBTQI issues and medical ethics. She is the author of over 60 publications in the areas of clinical ethics, gender and sexuality, and animal ethics.

Seth J. Gillihan, PhD, visiting Assistant Professor of Psychology, Haverford College.

Dr. Gillihan's research has addressed the neural, genetic, and behavioral correlates of psychopathology risk, the assessment and treatment of posttraumatic stress disorder (PTSD) and other anxiety diagnoses, dissemination of evidence-based psychological treatments, and conceptual issues related to the use of neuroimaging in psychiatry. His current areas of research include the associations between mindfulness and creativity (in collaboration with senior psychology students at Haverford College). Dr. Gillihan's teaching is focused on cognitive-behavioral therapy for anxiety and depression and the biological basis of behavior and psychopathology. He maintains a private practice in Haverford, PA.

Roy Hamilton, MD, MS, Assistant Professor of Neurology, Perelman School of Medicine at the University of Pennsylvania; Director of the Penn Laboratory for Cognition and Neural Stimulation

Dr. Hamilton's research interest is in the characteristics and limits of functional plasticity in the adult human brain; how the brain reorganizes itself in response to injury, and whether it is possible to enhance the brain's potential for reorganization in order to speed rehabilitation. His studies use a technology known as transcranial magnetic stimulation (TMS) to examine and manipulate the functional anatomy and connectivity of the brain in both healthy and injured states. Dr. Hamilton is also fundamentally interested in ethical implications of the use of noninvasive brain stimulation to enhance cognition in healthy individuals. Outside of his research, Dr. Hamilton is deeply interested in diversity as it relates to medical education. He is a core faculty member of the Perelman School of Medicine's Program for Diversity and Inclusion, and directs a variety of initiatives to advance the academic interests of undeserved and underrepresented minorities in medicine.

Joseph Kable, PhD, Baird Term Assistant Professor of Psychology, Department of Psychology, University of Pennsylvania

Dr. Kable's research employs an interdisciplinary approach to understanding how people make choices, and the neurophysiological mechanisms underlying decision-making. This work combines approaches from experimental economics, the psychology of judgment and decision-making, and social and cognitive neuroscience.

Bruce Lenthall, PhD, Director of the Center for Teaching and Learning, Adjunct Assistant professor in the Department of History, University of Pennsylvania

Lenthal has also taught in the history departments at Bryn Mawr College and Barnard College. As director of the Center for Teaching and Learning, he promotes educational excellence at Penn. He works with faculty, teaching assistants and other instructors to help them excel in their teaching, and seeks to enhance the culture of teaching at the university. In his own teaching and research, he explores 20th-century U.S. cultural, political and social history. He is the author of *Radio's America: The Great Depression and the Rise of Modern Mass Culture* (University of Chicago Press, 2007).

David Wolk, MD, Assistant Professor of Neurology, Cognitive Neurology Division, University of Pennsylvania

Dr. Wolk's research has focused on memory measures and other markers that allow for early detection of Alzheimer's disease. He currently investigates memory changes in healthy aging, Mild Cognitive Impairement, and Alzheimer's disease using Event-Related Potentials (a form of EEG), MRI (including structural and functional measures), and novel psychometric testing.

STAFF

Denise Clegg, MAPP, Managing Director of Penn Center for Neuroscience and Society

Denise Clegg has more than fifteen years executive management experience with expertise in organizational and funding development. Her work has focused on advancing policies, programs, and research with a positive social impact in the not-for-profit and academic sectors. Prior to joining the CNS, Denise launched and directed the Positive Neuroscience Project at the University of Pennsylvania. She is also a mindfulness meditation facilitator with the Penn Program for Mindfulness and teaches an undergraduate preceptorial on "Meditation and the Brain: Science and Experience."

Sara Strickland, Program Coordinator, Penn Center for Neuroscience and Society

Sara Strickland came to the Center for Neuroscience and Society from the Free Library of Philadelphia, where she managed the *One Book, One Philadelphia* literacy program. Her career has been focused on building capacity for nonprofits through strategic partnerships around development, marketing, and public programming. At CNS, Sara works to further the center's mission through coordination of events and educational opportunities for scholars, faculty, and professionals in affiliated fields.

The Penn Center for Neuroscience and Society would also like to thank Program Assistant Rochelle Shen and interns Leslie Sachs and Kanika Sawhney for their invaluable assistance in preparing for this program

Fernando Barbosa, PhD, Executive Coordinator of the Laboratory of Neuropsychophysiology, Professor of Psychology and Education, Sciences of the University of Porto, Portugal

Fernando Barbosa is a clinical psychologist with a PhD in biomedical sciences (neuroscience). He teaches three courses related to cognitive and affective neurosciences: Psychology, Forensic Sciences, and Neuroscience. His main research interests are related to emotional processing and its interference in decision-making, particularly in psychopaths, applying neuroscientific methods. He has published two books on biopsychological aspects of antisocial behavior and several peer-reviewed articles in the broad field of cognitive and affective neurosciences, mostly concerning psychopathy, schizophrenia, or methodological issues. He is a founding member of the European Society for Cognitive and Affective Neuroscience (ESCAN).

Marios Constantinou, PhD, Dean of Humanities, Social Sciences, and Law; Director of the Center for Cognitive and Behavioral Psychology; and Associate Professor of Psychology, Department of Social Sciences; University of Nicosia, Nicosia, Cyprus

Marios Constantinou graduated with a PhD in clinical psychology from the University at Albany, SUNY. He specialized in clinical child and forensic neuropsychology and his most recent research interests revolve around forensic and neuroethical issues, cognitive variables in the assessment of pain, and alleviating neurological and neurodevelopmental symptomatology with Cognitive Behavioral Therapy. He would like to implicate neuroimaging in his research after completing a series of trainings and postdoctoral trainings in the area. Dr. Constantinou is the recipient of numerous national and European grants and he is an active member of several European Union funded research and networking groups. His latest academic work is his published Greek book, *Neuropsychology of Learning Disorders*.

Dr. Nihal C. de Lanerolle, DPhil, DSc, Professor of Neurosurgery & Neurobiology, Yale School of Medicine; and Chaplain, Episcopal Church at Yale

Dr. de Lanerolle trained as an ethologist studying the neural mechanisms of vocalization in birds and mammals and has "evolved" into a neuroscientist/

neuroanatomist whose research for the past 25 years has been on the molecular neuropathology of human temporal lobe epilepsy, and more recently on explosive blast traumatic brain injury. He teaches functional neuroanatomy to medical students and undergraduates. He is also a theologian and an ordained priest of the Episcopal Church, and lectures on "science and religion" at Yale Divinity School.

Susanne Diekelmann, PhD, post-doctoral fellow at the Institute of Medical Psychology and Behavioral Neurobiology, University Tubingen, Germany

Dr. Diekelmann studied psychology and philosophy and gained her PhD in cognitive neuroscience. She is interested in elucidating the beneficial effect of sleep for memory formation. Her research focuses on memory reactivation and reconsolidation during sleep, as well as on the role of sleep for prospective remembering and the generation of false memories. She is also interested in the ethical and legal implications of neuroscience research for society, particularly concerning neuroenhancement. Dr. Diekelmann has published a number of peer-reviewed journal articles, including a highly recognized review on *The memory function of sleep* in Nature Reviews Neuroscience.

Julija Erhardt, PhD, Faculty of Science, Biology Department, Animal Physiology Unit; University of Applied Health Studies, Anatomy and Physiology Department, Zagreb University, Croatia

Dr. Erhardt obtained her PhD at Witwatersrand University in Johannesburg, South Africa, working on protein stability and folding. She spent much of her carrier in the pharmaceutical and biotech industry in Croatia and South Africa working on the optimization of the production processes of biopharmaceuticals. Recently she joined Zagreb University teaching neuroimmunology and physiology. Her research focuses around the effects that disturbed serotonin homeostasis induced by perinatal treatment has on the immune system. She has published several peer-reviewed journal articles and is organizing a course for education and training of people involved in work with laboratory animals (FELASA equivalent B and C) at the university.

Gidon Felsen, PhD, Assistant Professor, Department of Physiology and Biophysics, University of Colorado School of Medicine

Dr. Felsen's research focuses on the neural mechanisms of decision making and motor control, under both normal and pathological conditions. He addresses these questions using behavioral, electrophysiological, molecular, pharmacological, and computational techniques. He is also interested in the societal implications of the fact that humans make predictably suboptimal decisions, and in the application and ethics of approaches to improve decision making.

Ruth L. Fischbach, PhD, MPE, Professor of Bioethics and Director and Co-founder of the Center for Bioethics, Department of Psychiatry, Columbia's College of Physicians and Surgeons and Department of Sociomedical Sciences, Mailman School of Public Health

Dr. Fischbach is a bioethicist/sociologist whose scholarly work focuses on contemporary issues in bioethics including neuroethics, genetics, stem cell research, and advances in assisted reproductive technology. She has published several articles about neuroethics including the chapter "Why Neuroethicists are Needed" in *The Oxford Handbook of Neuroethics*, and intends to offer an elective course on neuroethics in the medical school. Currently, she is the PI on a study to assess concordance between parents of children on the autism spectrum and autism genetics scientists regarding attitudes and experiences with genetics and social stigma.

Gerald Dion Griffin, PhD, Assistant Professor, Department of Biology, Tuskegee University

Dr. Gerald D. Griffin is a neuroscientist and virologist. His research interests focus on the interplay between neurotropic viruses and the nerve cells they infect. He received his PhD. degree in the Neuroscience Graduate Group from the University of Pennsylvania, where he studied the effects of ovarian hormones on neuronal circuitry. He completed postdoctoral training in the Department of Microbiology at the University of Pennsylvania, focusing on how Herpes Simplex Virus Type I (HSV-I) alters neuronal gene expression. Presently, Dr. Griffin leads the neurovirology laboratory at Tuskegee University. Here he aims to dissect neural modifications induced by HSV-I

infection as well as look at how neuropeptides regulate HSV-I replication. In addition, his laboratory is interested in how viral infection leads to long-term changes in animal behavior.

Joseph S. Kass, MD, JD, Associate Professor of Neurology, Psychiatry and Medical Ethics; Neurology Residency Program Director and Member of the School of Tropical Medicine, Baylor College of Medicine; Director of the Cognitive Disorders Clinic and the Neurology Polytrauma Liaison, Michael E. DeBakey VA Medical Center, Houston

Dr. Kass is Chief of Neurology, Stroke Program Director, and Co-Chairman of the Ethics Committee at Ben Taub General Hospital, Houston's major public safety net Level I trauma hospital. Dr. Kass' particular clinical interests are in cognitive disorders, HIV neurology, and stroke. He teaches medical ethics to first and third year medical students as well as to residents in a number of departments and is interested in forensic applications of neuroethics. Dr. Kass completed his undergraduate education at Amherst College where he majored in Russian and then graduated from law school at Columbia University, where he was a Senior Editor of the Columbia Law Review. He then completed medical school, neurology residency, and a behavioral neurology/neuropsychiatry fellowship at Baylor College of Medicine, where he has been on faculty since 2005.

Erik Parens, PhD, Senior Research Scholar at The Hastings Center, Adjunct Professor in the Science, Technology, and Society Program, Vassar College, Senior Research Fellow at the Hastings Center for Bioethics

Dr. Parens has a broad interdisciplinary background in the humanities, but for the last couple of decades he has explored the reciprocal relationship between new technologies and our self-understanding. He has published widely in the bioethics literature.

Yoni Pertzov, PhD, Lecturer, Department of Psychology, Hebrew University of Jerusalem (from July 2013; currently post-doctoral research associate at the University College, London Institute of Cognitive Neuroscience)

Dr. Pertzov is a cognitive neuroscientist with a computational background. The

main questions that motivate his research revolve around visual memory and attention. How do we maintain previously perceived information over time and across eye-movements? What are the mechanisms underlying forgetting in healthy people and patients with brain disorders? He is currently engaged in investigating these topics using various research methods including neuroimaging and behavioral experiments in healthy individuals and patients with neurological disorders. He is also part of a team that is developing a new computational framework designed to capture novel, key aspects of visual memory encoding and maintenance.

Patricia Reuter-Lorenz, PhD, Professor of Psychology, Department of Psychology, University of Michigan; Co-Director, Max Planck International Research School on Lifespan Development

Dr. Reuter-Lorenz is a cognitive neuroscientist who studies cognitive and neural mechanisms of age-related decline. Using brain imaging and behavioral methodologies, she researches the effects of healthy and pathological aging on working memory and executive functions, along with interventions that may promote improved cognitive functioning. She has published over 85 peer-reviewed journal articles, edited two books, and serves as editor for two major journals in cognitive neuroscience.

Amir H. Rezvani, PhD, Professor of Psychiatry and Behavioral Sciences and Psychology and Neuroscience, Duke University

Dr. Rezvani is a neuroscientist whose research areas deal with the neuronal basis of addiction, particularly alcohol and nicotine addictions using animal models of drug administration. His research also involves drug development for the treatment of alcoholism and nicotine addiction as well as improving cognitive functions. He has published over 150 peer-reviewed articles and book chapters. Dr. Rezvani loves to teach and interact with students and the public. Since arriving at Duke in 1999, he has been teaching a course on biomedical aspects of addiction.

Jesse Rissman, PhD, Deptartment of Psychology, Department of Psychiatry and Biobehavioral Sciences, Integrative Center for Learning and Memory, University of California, Los Angeles

Dr. Rissman's research explores the interplay of attention and memory, using fMRI to characterize the neural circuits that support these fundamental cognitive processes. He has been a leader in the development and utilization of novel neuroimaging data analysis techniques to examine the dynamic interactions between brain regions, as well as to decode the informational content of distributed brain activity patterns. His recent research, supported in part by grants from the MacArthur Foundation's Law and Neuroscience project, has aimed to critically evaluate the potential use of fMRI technology as a forensic tool to detect the presence or absence of individual memories in a person's brain.

David Schneeweis, PhD, Assistant Director, Interdepartmental Neuroscience
PhD Program; Instructor in Biomedical Engineering, Northwestern University

Dr. Schneeweis was formally trained as a biomedical engineer and conducted research on visual processing in the retina at the Smith-Kettlewell Eye Research Institute and the University of Illinois at Chicago before migrating to his current position at Northwestern University. Currently he oversees day-to-day operations of Northwestern's Neuroscience PhD program (NUIN), and oversees several NIH T32 Training Programs. Dr. Schneeweis is very active in Responsible Conduct of Research (RCR) training, having helped develop and currently teaching RCR courses for life science PhD students, Biomedical Engineering graduate students, and postdoctoral and clinical fellows. He also teaches in the biomedical engineering undergraduate curriculum.

Adam Shriver, PhD, Postdoctoral fellow, Rotman Institute of Philosophy & the Brain and Mind Institute at the University of Western Ontario

Dr. Shriver works at the intersection of ethics, philosophy of mind, and cognitive science. His research investigates what the neuroscience of valenced experiential states can tell us about theories of well-being and beneficence. His dissertation and forthcoming publications challenge the assumption that pleasure and pain play symmetrical roles in well-being. Prior to that, he argued that other mammals appear to have the same affective components of pain that underlie suffering in humans, and explored the possibility of using genetic engineering to diminish the suffering of animals on factory farms. At Western, Dr. Shriver is working with the laboratories of Dr. Adrian Owen and Dr. Derek Mitchell, and has joined a group of philosophers and neuroscientists examining

the ethical implications of using fMRI to detect consciousness in behaviorally non-responsive patients.

Stephen Sodeke, PhD, MT(ASCP), Bioethicist and Professor of Allied Health, Tuskegee University National Center for Bioethics in Research, Tuskegee University

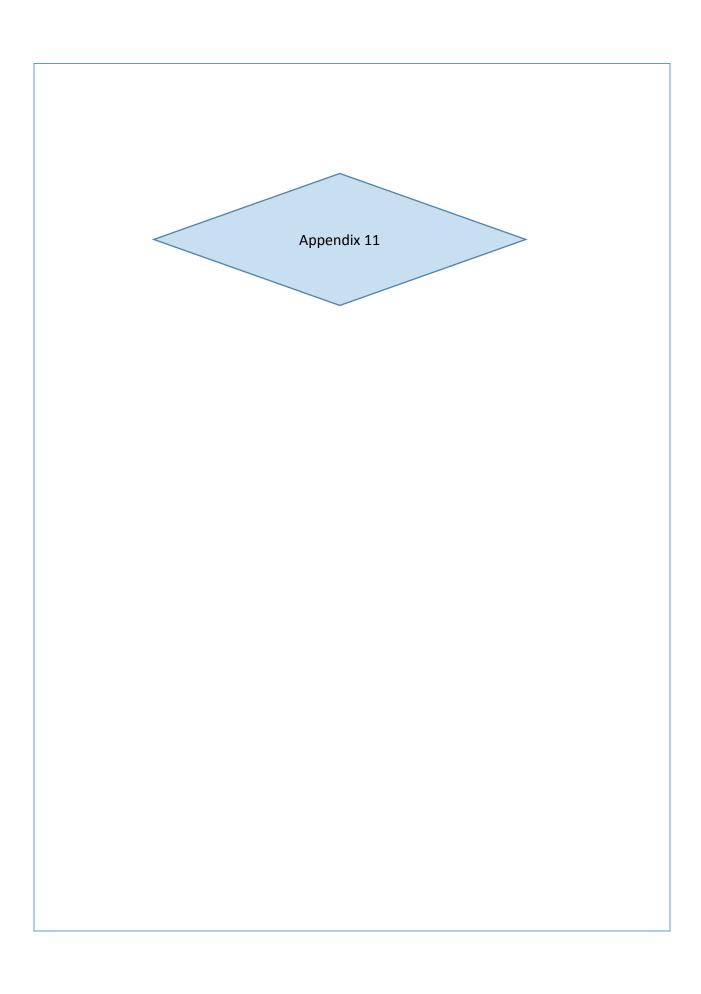
Dr. Sodeke contributes to Bioethics education and training at Tuskegee University. He is an accomplished professor of allied health sciences who has served as Director of the Tuskegee University Bioethics Center. He currently is Bioethicist and Professor of Allied Health, at the College of Veterinary Medicine, Nursing and Allied Health, Tuskegee University, and chairs the Tuskegee University Institutional Review Board. Dr. Sodeke's research includes community bioethics, research ethics, health and human rights, ethical issues raised by clinical trials, health disparity, and by research with vulnerable populations in the United States and in the developing world.

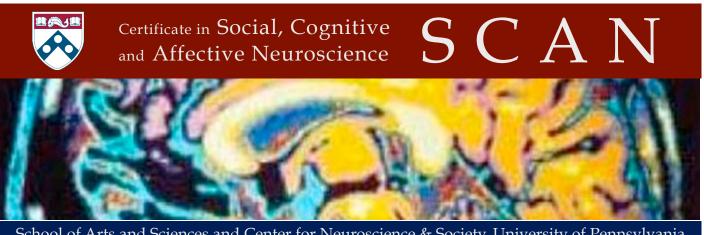
Rochelle E. Tractenberg, PhD, MPH, PhD, PStat® Founding Director, Collaborative for Research on Outcomes and -Metrics; Associate Professor of Neurology, Biostatistics, Bioinformatics & Biomathematics, and Psychiatry; Georgetown University

Dr. Tractenberg is a cognitive scientist, biostatistician, and measurement expert with three main research foci: assessment and measurement methods, models, and instrumentation for brain aging and brain injury (TBI/stroke); clinical trials for challenging-to-measure disorders, symptoms and outcomes; and graduate education, curricula and evaluation. She is currently funded by NSF and a private foundation to study a curriculum building and evaluation tool she created in 2009, focusing on teaching ethical reasoning, rather than ethical facts, to support the responsible conduct of research. She has published 59 peer-reviewed journal articles (with three currently in review/revision), as well as editorials and chapters on topics including novel statistical and educational methods, clinical trials, neuroepidemiology, and curriculum building and evaluation.



The mission of the Center for Neuroscience & Society is to increase understanding of the impact of neuroscience on society through research and teaching, and to encourage the responsible use of neuroscience for the benefit of humanity. neuroethics.upenn.edu





School of Arts and Sciences and Center for Neuroscience & Society, University of Pennsylvania

GOALS OF SCAN

The SCAN Certificate program enables graduate and professional students preparing for a wide range of careers to work knowledgeably with neuroscience. Rather than training future neuroscientists, the program's aim is to supplement the education of people with expertise in other areas, enabling them to incorporate some of the concepts and methods of neuroscience into their work. The curriculum focuses on the aspects of neuroscience that have the most direct application to the understanding of human behavior, specifically cognitive and affective neuroscience.

More specifically, the SCAN certificate fosters:

Understanding: Offering students from a wide variety of non-science disciplines a basic grasp of neuroscience, at a stage of their educational career (i.e. post-undergraduate) when opportunities to master another field are rare.

Productivity and creativity: Enabling students to recognize topics and findings within neuroscience that can be incorporated into their work.

Critical thinking: Equipping students with the knowledge and skills to critically evaluate both neuroscience research itself and the relevance of that research to their field.

Broadened teaching portfolios: Preparing those students planning an academic career with the expertise needed to teach a course on the intersection of neuroscience and their field.

Intellectual community: Situating students in an interdisciplinary community of individuals from humanities, social sciences and professions, all seeking new insights about human behavior and human experience from the study of the brain.

PROSPECTIVE STUDENTS

The program serves a wide variety of students, who have in common the need to understand the implications of contemporary neuroscience for their field of study. Although there will of course be differences in the aspects of neuroscience that are most relevant to different fields, there is a surprisingly large common core of knowledge that is essential for many of the disciplines and professions. This common core encompasses the neuroscience of human psychology and behavior, in other words social, cognitive and affective neuroscience.

Likely students include:

- Law school students interested in the many ways in which neuroscience relates to legal issues, e.g., the brain bases of self-control, criminal behavior and rehabilitation, regulatory issues in biotechnology/neurotechnology, the use of brain imaging evidence concerning competence, responsibility, and truthfulness
- Annenberg students interested in the neuroscience of communication and persuasion
- Wharton PhD students interested in the neuroscience of decision-making and marketing, or the business of brain-related medications and devices
- **GSE doctoral students** interested in the implications of neuroscience for the teaching and learning of average, gifted and special needs students; or interested in science teaching with a focus on neuroscience
- Medical and nursing students interested in specialties such as cognitive neurology, neuropsychiatry, neurobehavioral pediatrics and geriatrics
- Doctoral students in fields such as:

Computer and Information Science with a focus on artificial intelligence or human-computer interaction

Criminology with a focus on neural contributions to criminal behavior or corrections

Economics with a focus on neuroeconomics

History and Sociology of Science with a focus on H&SS of neuroscience

Linguistics with a focus on neurolinguistics

Literature with a focus on cognition and neuroscience in literary theory

Philosophy with a focus on philosophy of mind or on neurophilosophical approaches to metaphysics, epistemology or ethics

Religious Studies with a focus on neurotheology

Sociology with a focus on biological mechanisms underlying societal phenomena

Statistics and Applied Math with a focus on the modeling of neural networks or the analysis of neuroimaging data

CURRICULUM

SCAN is a 4-course program, which students can complete in 1-2 years in parallel with study toward their graduate degree. A small number of non-degree students may be admitted to work toward the SCAN Certificate outside of a graduate degree program. The required courses provide a strong grasp of neuroscience for nonscientists, emphasizing those aspects of neuroscience that are most relevant to understanding human behavior. There will also be an annual retreat.

Two required courses:

Foundations of Social Cognitive and Affective Neuroscience, PSYC 547 (G) To be taken in the fall of first year. An introduction to the core methods and topics of social, cognitive and affective neuroscience, emphasizing the study of the human brain. (See next section for more details.)

Special Topics in Social, Cognitive and Affective Neuroscience PSYC 747 (G) Generally taken in parallel with the Foundations course, but can also be taken afterward. A closer look at current topics of particular relevance to students in the SCAN Certificate program, designed to help students critically read primary sources. (See next section for more details.)

TWO additional courses from the following THREE categories:

- **i. Advanced neuroscience course (G or UG/G)** Chosen from 400-level or higher courses on specific subfields of neuroscience (See next section for more details.)
- **ii.** Neuroscience and society course (G) Chosen from graduate courses on the relation of neuroscience to society: Neuroethics or Law and Neuroscience. (See next section for more details.)
- iii. **Bridging course (G)** from the student's home program or a closely related program that bridges to neuroscience. The availability of bridging courses will vary by program and by year. Courses will be approved on a case-by-case basis by the Advisory Board.

MORE INFORMATION ON REQUIRED COURSES:

Foundations of Social, Cognitive and Affective Neuroscience PSYC 547 (every fall)

This course is designed to introduce students to the interdisciplinary field of social, cognitive and affective neuroscience. We will begin with the basics of neurons, synapses and neurotransmission and the functional organization of human brain anatomy. Neuroscience methods to be covered include cellular recordings, EEG/ERP, lesion methods, structural and functional neuroimaging and brain stimulation. The remainder of the course will cover the neural systems involved in learning and memory, perception, emotion, executive function and social cognition, with a focus on how our understanding of these systems has emerged from the use of the methods studied earlier. Brain development and genetic influences on brain function will also be discussed. Classes will combine lecture and discussion, as well as frequent short quizzes. Homework will include regular written assignments reinforcing the reading and lecture content.

Special Topics in Social, Cognitive and Affective Neuroscience PSYC 747 (every fall)

In this seminar students will learn about contemporary research on selected topics in social, cognitive and affective neuroscience and deepen their understanding of a variety of methods in neuroscience, including methods for studying human and animal subjects. This will be accomplished by a combination of lecture and discussion, along with collaborative reading and analysis of recently published journal articles. Selected classes will focus on the work of speakers presenting at various neuroscience-related colloquium series on campus.

Advanced neuroscience courses (examples - will vary from year to year):

Behavioral Genetics (BIBB 451-401)

Behavioral Pharmacology (BIBB 481-301)

Biological Basis of Psychiatric Disorders (BIBB 480-601)

Clinical Psychopharmacology (BIBB 482-601)

Clinical Research in Neuroscience (BIBB 409-301)

Human Brain Imaging: Functional Imaging of the Human Brain (BIBB 409-301)

Neural Systems of Behavior (BIBB 479-401/ PSYC 479-401)

Neurobiology of Learning and Memory (BIBB 442-401)

Neurodegenerative Diseases (BIBB 475-301)

Neuroeconomics (PSYC 473-401)

Seminar in Cognitive Neuroscience: Consciousness (PSYC 449-301)

Neuroscience and Society Courses:

Neuroethics, Jonathan Moreno (BIOE 555-001)

Neuroethics, Martha Farah (PSYC 705-401)

Law and Neuroscience, Stephen Morse and Amy Wax (LAW 981-001)

Bridging Courses:

The following courses are examples of courses that would enable students to use some of their knowledge of SCAN to address questions at the heart of their home disciplines. All Bridging Courses would be subject to the approval of the SCAN Advisory Board:

Biomedical Image Analysis (CIS 537)

Ethics in Mental Healthcare (BIOE 590-001)

Philosophy of Mind (PHIL 530)

Science and the Sacred (SM 501)

Science and Literature (SM 511)

CERTIFICATE FACULTY

The SCAN certificate was developed by the faculty of Penn's Center for Neuroscience & Society and is offered by the School of Arts and Sciences.

SCAN Program Director

Martha J. Farah (Psychology, Director, Center for Neuroscience & Society)

SCAN Advisory Board

Geoffrey K. Aguirre (Neurology, Associate Director, CNS)

Russell A. Epstein (Psychology)

Joe Kable (Psychology)

Stephen J. Morse (Law, Associate Director, CNS)

QUESTIONS?

See the SCAN website at http://www.neuroethics.upenn.edu/index.php/education/scan-certificate-program for more information, including a frequently updated FAQ Google doc. Please address any questions to: info@neuroethics.upenn.edu