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Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.01SA/MMM1

Topic: J.01. History of Neuroscience

Title: Strange serendipities in the history of neuroscience

Authors: *L. KRUGER;
Dept Neurobio., UCLA Geffen Sch. of Med., Los Angeles, CA

Abstract: The first printed and illustrated monograph devoted to the brain compared a "changeling" child's brain to a "normal adult" brain published by Thomas Willis (1664) and illustrated by Wren (PRS), but largely erroneously interpreted. The first monograph published by the Royal Society in England (1680) "The Anatomy of a Porpess", derives from an anatomical account of a porpoise that had serendipitously wandered from the River Thames into London's St. James' Park, where it succumbed and was obtained for dissection by Edward Tyson, the "father" of Comparative Anatomy and of Primatology in England. His training in 'physick' led Tyson to evade the conundrum of how the human brain differs from that of 'brutes', but enabled accurate comparison of chimpanzee, pygmy and black African brains with that of 'Caucasians'. Many18-19 C. advances proved ponderously slow and often misdirected, but 20 C. serendipities exceed practical enumeration. Re-discoveries proved prominent in exploring the rules of genetics, beginning with the re-discovery of Mendel's general laws of gene inheritance in plants-after failing with rodents. In the early 19 C, Morgan's school of fruit-fly genetics exploited Muller's discovery of the effects of X-rays on chromosomal alterations and Sturtevant (1913) constructed a **genetic** map of a chromosome. Mechanisms of postnatal gene alteration-'epigenesis', were adduced, and Benzer fathered a new field of "neurogenetics". By mid-20th century, determination of the rules of four nucleotide base-pairing by Chargaff and X-ray diffraction images by R. Franklin indicated the paired alpha-helix structure of DNA that enabled Watson and Crick to race to reconstruction of a model forming the molecular basis of biological inheritance. Exploitation of invertebrate animal models in mid-20 C. enabled the Hodgkin-Huxley analysis of the action potential in the giant axons of squid and the discovery of Ca ion channels in the barnacle eye (Hagiwara). Electrophysiological mapping of the sensory projections to cerebral cortex of mammals (Woolsey, Marshall, Adrian) and fine microelectrodes enabled identifying neuron properties related to early visual experience (Hubel and Wiesel). French 'discovery' of non-ocular photon effects on duck brain neurons (Benoit); and study of the pigments and electrical properties of giant neurons in Aplysia (Chalazonitis, Arvanitaki) eventually led to synaptic correlates of behavior (Kandel) and analysis of practical "optogenetic" study and control of neuronal molecular and electrical events.

Disclosures: **L. Kruger:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.02SA/MMM2

Topic: J.01. History of Neuroscience

Title: The weber test for hearing - not a straightforward eponymous term

Authors: ***B. W. BAKKUM**;
Illinois Coll Optometry, Chicago, IL

Abstract: Weber is a common surname of German origin. In German it is pronounced: 'Vay br. With migration to English-speaking regions, its pronunciation has been commonly anglicized to: 'Web br. It is not surprising that more than a few people named Weber have made significant contributions to the scientific and medical world and have eponymous terms associated with their names. The Weber's test for hearing is a neurologic screening test that uses bone conduction in order to help detect both unilateral conduction and sensorineural hearing losses. On a patient with an asymmetric hearing loss, a Weber's test is performed by placing a vibrating 512 Hz tuning fork in the center of the top of his/her head. If the patient hears the tuning fork louder in the defective ear this suggests a conduction hearing loss in that ear. If the patient hears the tuning fork louder in the normal ear, then a sensorineural loss in the defective ear is indicated. Even though the Weber test is named after a German physician: Ernst Heinrich Weber (1795-1878), he did not describe the procedure of the test nor even discover bone conduction. The earliest written description of bone conduction experiments was in 1550 by Girolamo Cardano (1501-1576). Although this phenomenon was actually first discovered by Giovanni Filippo Ingrassia (1510-1580) around 1546, his work, which included the discovery of the stapes, was only posthumously published in 1603. What Weber did actually discover in 1834 was the occlusion effect, ie, increased perception of bone conduction when the external auditory meatus is occluded and the phenomenon of lateralization of increased perception of bone conduction to the side of the occluded ear. Since Weber was an anatomist, he did not appear to be interested in the clinical application of his finding. It was not until about a decade later that the diagnostic technique that became known as the Weber test was described. Some claim that this was done in 1845 by Jean Pierre Bonnafont (1805-1891). It appears, though, that Bonnafort only stated that in certain types of hearing loss, the perception of high frequency tuning forks is more diminished than that of low frequency tuning forks. Therefore, the first uncontroversial description of the technique of the Weber test was made by Eduard Schmalz (1801-1871) in 1846. It should be

noted that some sources associate this eponym with Friedrich Eugen Weber-Liel (1832-1891) who was a German audiologist that actually did develop a method of healing some types of partial hearing loss with tenotomy of the tensor tympani muscle in 1868. With over 20 Weber eponyms and nearly 10 people associated with them, it should not be surprising that some confusion in the literature exists.

Disclosures: B.W. Bakkum: None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.03SA/MMM3

Topic: J.01. History of Neuroscience

Title: Historical analysis of the role of theory in the development of neuroscience

Authors: *J. PORTES;
Dept. of Neurosci., Columbia Univ., New York, NY

Abstract: There is no question that quantitative and computational approaches have contributed significantly to all areas of neuroscience, from the elegant Hodgkin-Huxley equations to the current statistical techniques used for the analysis of volumetric neural data. What is less certain, however, is the role of so-called “theoretical neuroscience” in the development of the field. In physics, for example, the value of an abstraction of a physical system using mathematically precise models to bring to light previously observed phenomena and predict future observations is abundantly clear. In neuroscience, this is not necessarily the case. In this study we examine a handful of historical examples where theoretical neuroscience has played an important role in the development of a particular subfield. These include general frameworks such as efficient coding and natural stimuli, nonlinear dynamics of networks, and Bayesian inference, as well as the more specific theories of associative memory and reinforcement learning. While many of these topics developed into fascinating areas of research such as artificial intelligence, their overall contribution to experimental neuroscience remains modest but respectable. This study combines analysis of research trends such as growth of research positions and publications with interviews and information from the few books on the history of the field.

Disclosures: J. Portes: None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.04SA/MMM4

Topic: J.01. History of Neuroscience

Title: Neurogenesis in the adult brain: a history of findings from neuroscience research

Authors: *K. CHANDLER[1], N. SALMASO[1,2];
[1]Neurosci., Carleton Univ., Ottawa, ON, Canada; [2]Child Study Ctr., Yale Univ., New Haven, CT

Abstract: The existence of neurogenesis in the adult brain has been a controversial topic of debate in neuroscience for decades. As early as 1938, Ramón y Cajal stated that neurons lacked the ability to proliferate and differentiate and that they cannot be regenerated. It was believed that neurogenesis, the generation of new neurons in the brain, only occurred during early development and not in the adult brain. Scientists such as Altman and Kaplan published work in the 60's and 70's that supported the existence of neurogenesis in the adult brain of rats. In the early 80s, several key researchers including Nottebohm and his student Alvarez-Buylla discovered ongoing neurogenesis in the adult brain of song-birds by using thymidine analogs to track cell proliferation. The implications of these findings were refuted by other scientists in the field; claiming that although it may be found in canaries, adult neurogenesis was simply not present in humans. In 1999, Gould found evidence of neurogenesis in the adult brain of macaque monkeys in the hippocampus. The new cells were being born along the walls of the lateral ventricles and then continued to migrate and differentiate throughout the telencephalon. The cells in the SVZ were categorized as migrating neuroblasts, ependymal cells, immature precursors and astroglia. A subset of astroglia in the SVZ can act as neural stem cells that are able to differentiate into new astroglia, oligodendrocytes and neurons. Since this discovery, neural stem cells have been studied extensively to understand their potential role in disease and rehabilitation and have been employed in a variety of therapeutic contexts. Notably, Studer isolated multipotent stem cells and cultured them, promoting differentiation into dopaminergic neurons in order to replace those cells lost in Parkinson's disease. In 2007, the discovery of four key genes expressed in stem cells allowed Shinya Yamanaka to reprogram human fibroblast cells into induced Pluripotent Stem Cells (iPSCs) and was able to create iPSCs that could differentiate into functional neurons. The discovery of iPSCs introduces the possibility of discovering novel human cell replacement therapies for neurodegenerative diseases such as amyotrophic lateral sclerosis. While it is without question that there is a tremendous amount of research that must be conducted before these findings will translate into novel therapies for human disease, the strides made over the last 30 years in stem cell research indicate a bright future for this field.

Disclosures: K. Chandler: None. **N. Salmaso:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.05SA/MMM5

Topic: J.01. History of Neuroscience

Title: Hans berger The founder of human encephalography

Authors: M. F. KIRMANI[1], E. FONKEM[2], *B. F. KIRMANI, Esq[3,4], M. A. A. NAMBOODIRI, PhD[5];
[1]Meridian IB World Sch., Round Rock, TX; [2]Neurosurg., Scott and White Neurooncology, Baylor Scott and White Health/ Texas A& M Univ. HSC Coll of Med., Temple, TX; [3]neurology, T, Georgetown, TX; [4]Neurol., Scott and White Epilepsy Center, Baylor Scott and White Health/ Texas A& M Univ. HSC Coll of Med., Temple, TX; [5]Dept of Anatomy, Physiol. and Genet., Uniformed Services Univ. of Hlth. Sci., Bethesda, MD

Abstract: Hans Berger (1873-1941) was a German psychiatrist who was the inventor of the most revolutionary invention in the neurological field, the electroencephalogram. Hans Berger was born on May 21, 1873 in Neuses, Germany. He was born to Paul Friedrich Berger, a physician, and of Anna Rückert. His maternal grandfather was a German poet who was known for his research in Oriental philosophies. He obtained the medical degree from Jena in 1897, and joined as staff in psychiatry and neurology at the Jena clinic and became Chair in 1919 .He was able to work with two renowned physician scientists, Oskar Vogt (1870-1959) and Korbinian Brodmann (1868-1918) in their research which involved the laterization of brain function. The interest in brain function led him more closer to his famous invention to the medical field, the Electroencephalogram (EEG).The EEG machine records the electrical activity of the brain and is used as a crucial tool for the detection of epilepsy and related neurological disorders. He followed the pioneering experiments of British scientist Richard Caton (1842-1926) with animals, and measured electrical activity of the cerebral cortex in patients. He would measure brain activity in these patients by using various instruments like the Edelmann string galvanometer, which was used to record electrocardiograms, and after modifying this instrument's mechanisms several times, better results were achieved. In 1924, the first electroencephalogram (EEG) recording of human brain activity was recorded by Dr. Berger. He was the first scientist to describe differences in the brain rhythms in the normal and abnormal brains, and did this by performing electroencephalograms in patients with dementia, epilepsy, and other neuropsychiatric disorders. He also discovered the alpha wave rhythm also known as "Berger's wave" or "waves of attention" and beta waves were associated with activity of the cortical tissue. He published papers on electroencephalography in 1929, but he only received international recognition for his work in 1934 when the findings were confirmed by two

renowned scientists, Adrian and Matthews. Hans Berger died in 1941, but his revolutionary invention still remains the most valuable contribution and asset in the field of clinical neurology.

Disclosures: **M.F. Kirmani:** None. **E. Fonkem:** None. **B.F. Kirmani:** None. **M.A.A. Namboodiri:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.06SA/MMM6

Topic: J.01. History of Neuroscience

Title: The history of the basal ganglia

Authors: *A. PARENT;
Psychiat. & Neurosci. Dept, Univ. Laval, Quebec City, QC, Canada

Abstract: The basal ganglia (BG) concept emerged through a remarkably long and convoluted history. In Antiquity, Galen (129-c. 200) was the first to report a ventrally located mass of nervous tissue probably corresponding to our BG and which he termed the gluteal part of the brain. However, it took more than 1300 years before the famous Renaissance anatomist Andreas Vesalius (1514-1564) delineated the BG core structures, but without naming them or speculating upon their functions. This was left to Thomas Willis (1621-1675), who, in mid-17th century, introduced the term *corpus striatum* (striated or chamfered body) to designate the largest BG constituent, which he considered a major sensorimotor integration center. Early In the 18th century, Raymond Vieussens (1641-1715) proposed the name *grand ganglion cerebral* (large cerebral ganglion) for the BG, whereas later in the century Félix Vicq d'Azyr (1748-1794) contributed a remarkably accurate depiction of the major BG components. He was also the first to detect the *substantia nigra*, which he called *tache noirâtre* (dark spot) or *locus niger crurum cerebri*. Early in the 19th century, Karl Friedrich Burdach (1776-1847) provided a BG description that is still valid today. Differentiating the caudate nucleus from the putamen, he termed them *Streifenhügel* (elongated hillock) and *Schale* (shell), respectively. He called *Linsenkern* our current lentiform nucleus and identified its paler inner component (*blasser Klumpen*) that he named globus pallidus. He also identified the medial and lateral pallidal segments and pointed out that the BG nuclei are separated from one another by fibers fascicles that he termed internal and external capsules. In mid-19th century, Jules Bernard Luys (1828-1897) identified the subthalamic nucleus, as well as the *centre médian*, a thalamic nucleus closely linked with the BG. Following Burdach's description, the caudate nucleus and putamen were considered distinct BG components. Early in the 20th century, however, Cécile Vogt-

Mugnier (1875-1962) and Oskar Vogt (1870-1952) challenged this view by showing that the primate caudate nucleus and putamen are linked together anteriorly through *nucleus accumbens*, the three structures forming a single cytoarchitectonic entity, which they simply termed *striatum*. Despite these landmark historical contributions, as well as the wealth of knowledge about the BG organization that emerged during the last 75 years, which largely surpasses what has been accumulated from Antiquity to early 20th century, the BG history is far from its end since much uncertainty remains about the exact contributions of its various components to motor control and sensorimotor integration.

Disclosures: A. Parent: None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.07SA/MMM7

Topic: J.01. History of Neuroscience

Title: Probing the extent and boundaries of perceptual, conceptual and cognitive space: insights and lessons from Bach and van Eyck

Authors: *E. L. ALTSCHULER;
Physical Med. and Rehabil., Temple Univ. Sch. of Med., Philadelphia, PA

Abstract: Modern methods of neuroscience—e.g., RNA sequencing, photon microscopy, MRI—are effective at understanding neural processes at the level of a given brain area, cell or single molecule level. However, many important questions and problems are complex, multifactorial, non-linear and distributed in time and space. Study of the works of great artists and composers from the past can be useful in defining and answering questions to delineate and explore cognitive, perceptual and conceptual space. The convex mirror on the back wall of the room in the painting the Arnolfini Wedding by Netherlandish painter Jan van Eyck (before c. 1390-1441) raised far reaching cognitive and perceptual issues of reflection and self-reflection. Mirrors are used in used in contemporary neuroscience to study peripersonal and distant space. van Eyck's amazing signature next to the mirror seems to be at the limit of artistic output with a single stroke. With incomparable skill van Eyck probes visual perceptual and cognitive limits: We are able to just perceive wisps of a baby's, woman's or old man's or stubble hair. Amazingly complex details can be appreciated even in miniature in a carpet or jewelry design, and also at apparently a higher level in the folds of a woman's dress or man's turban. JS Bach (1685-1750) is encyclopedic in use of the known compositional techniques and styles of his and prior times. Further, measure 12 of the Sarabande from the d minor violin partita (BWV 1004) has a whole

tone scale. Bach resolved German augmented sixth chords using parallel fifths—"Mozart's fifths." The motive of Bach's a minor prelude from *WTC* Book Two uses all twelve pitches without repetition (ELA, ND Elkies, Musical Times 2009;150(3) 5) presaging the 12-tone technique of 20th century composition. So Bach is encyclopedic also about future techniques too! This motivates a search for more in Bach. Bach has Möbius, cylinder and torus topologies in canons from the Musical Offering (BWV 1079) and the "extra" 14 canons based on the Goldberg Variations bass theme (BWV 1087) (ELA, A Phillips, MT 2015;156(4) 57-64). We can now then study the neural threshold to hear Möbius vs. cylinder topology?, e.g., when an inversion canons is played on violin and viola *vs.* 2 violins. More profoundly to probe absolute perception of information in time compare perception and appreciations for tempos of pieces marked Presto—i.e., as fast as possible—e.g., solo violin sonata movement BWV 1001/4 with those marked Allegro—fast but not presto—e.g., BWV 1003/4, 1005/5 (Allegro assai).

Disclosures: E.L. Altschuler: None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.08SA/MMM8

Topic: J.01. History of Neuroscience

Title: The invisible women in science

Authors: N. NUR[1], K. PEDEMONTE[1], *J. M. FLINN[2];
[1]Neurosci., [2]Psychology, George Mason Univ., Fairfax, VA

Abstract: The Nobel Prize is perhaps the most esteemed award for scientific research. Each year, it recognizes outstanding works in the fields of chemistry, physics, medicine, as well as other non-scientific fields. Becoming a Nobel Prize laureate is among the highest achievements and most honorable title for a scientist. However, there is a major gender bias among Noble Prize laureates, which is even more prevalent in the scientific fields. From 1901 to 2015, the Nobel Prize and the related Nobel Memorial Prize in Economic Sciences have been awarded 900 times to 870 individuals and 23 unique organizations. Of the 870 Noble Prize laureates, only 48 (5.52%) were women. The following analysis examines gender bias among Nobel Prize laureates by category and time period. Apart from the 48 women who were awarded the Noble Prize, there is a far greater number of women who were never recognized or given credit for their work - the invisible women in science. These are women who made major contributions to their fields of study while others were credited for their groundbreaking discoveries. Although this analysis is dedicated to the legacy of all the invisible women in science, we cannot reference all those

deserving individuals here. We highlight seven women - Jocelyn Bell, Rosalind Franklin, Henrietta Leavitt, Esther Lederberg, Lise Meitner, Chien-Shiung Wu, and Marianne Grunberg-Manago - who made astonishing scientific discoveries while others received credit for their work.

Disclosures: **N. Nur:** None. **K. Pedemonte:** None. **J.M. Flinn:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.09SA/MMM9

Topic: J.01. History of Neuroscience

Support: Alexander von Humboldt Scholarship to AG

MNARS Scholarship to KH

Title: The concept of the dual origin of the cortex

Authors: K. HEUER[1], *A. GOULAS[2];
[1]Max Planck Inst. for Human Cognitive and Brain Sci., Leipzig, Germany; [2]UKE/Institute For Computat. Neurosci., Hamburg, Germany

Abstract: Unravelling principles underlying cortical architecture is a fundamental neuroscientific endeavour. One such organizational principle is the dual origin of the cortex. According to this theory, cortical areas follow gradients of successive differentiation (trends) stemming from two primordial moieties: the hippocampus (archicortex) and the piriform cortex (paleocortex).
The first stage of the theory can be traced back to Shellshear (1929) who proposed the duality of the echidna cortex based on angiography mapping. Later, cytoarchitectonic findings suggested a dual structure of the reptilian brain (Dart 1934). In mammals, Abbie was the first to trace back cortical areas to their origin in the hippocampus (1938) and later revealed the piriform cortex as the second primordial site (1940, 1942). These cytoarchitectonic studies show gradual changes of granularization for both trends.
With his work on the human frontal lobe, Sanides (1962) initiated a second stage of the theory expanding it by findings from several mammalian species (1970). In his view, the gradations also offer a mechanistic explanation for cortical gyrification giving rise to a unifying concept: Windungsgradationsprinzip (convolution-gradation principle). His investigations of primates uncovered the phenomenon of Externopyramidisierung (externopyramidization), characterizing

hand in hand with granularization the stepwise changes along the trends. He reports these gradual changes also for the myeloarchitecture.
The third stage, initiated by Pandya and colleagues with their work on the macaque brain, enriches Sanides' concept with root, core and belt, a tripartite cytoarchitectonic division based on eulamination orthogonal to the main trends. Importantly, these studies demonstrate that the duality of the cortex is reflected in the patterns of cortico-cortical connections (Pandya et al. 2015).
In synthesis, the dual origin theory suggests that gradients of cytoarchitectonic differentiation always satisfy the principle of granularization, whereas externopyramidization is only reported in primates. The gradual shift of more and larger pyramidal cells from lower to upper layers might explain an analogous shift of the laminar origin of cortico-cortical connections. Not all authors explicitly support an evolutionary interpretation of the gradual changes in cyto- and myeloarchitecture. Quantitative analyses in more species reveal a dual structure of the cortex based on connectional and transcriptional data (Goulas et al., accompanying abstract submission). Thus, the dual origin of the cortex can serve as a framework bridging multiple levels of organization of the cortex.

Disclosures: **K. Heuer:** None. **A. Goulas:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.10SA/MMM10

Topic: J.01. History of Neuroscience

Title: Progress in the scientific study of cognition: Have valid constructs mattered?

Authors: ***J. A. SULLIVAN**[1,2,3], M. A. KHALIDI[4,5];
[1]Dept. Philosophy, [2]Rotman Inst. of Philosophy, [3]Brain and Mind Inst., Western Univ., London, ON, Canada; [4]Philosophy, [5]Cognitive Sci. Program, York Univ., Toronto, ON, Canada

Abstract: Psychology and neuroscience share the goal of illuminating the processes by which humans acquire knowledge about themselves and the world. In psychology, investigators have historically placed a high value on “construct validity”. In other words, they aim to develop tasks that measure or individuate those aspects of cognition (e.g. intelligence) or those cognitive processes (e.g. working memory) that they intend those tasks to measure. Additionally, in the ideal case, that feature of cognition or cognitive process that a task measures actually corresponds to a real feature or process in the natural world. For example, intelligence tests are supposed to measure intelligence, which is taken to be a real attribute that a person can have to

varying degrees. Given the importance of construct validity in the cognitive sciences, in this poster we aim to address several questions by considering historical case studies from both psychology and neuroscience. First, what are the distinguishing features of a valid construct and how are valid constructs differentiated from invalid ones? Second, what role do constructs play in psychological explanations, and how important is construct validity for the success of such explanations? Third, given that psychology and neuroscience both aim to explain cognition, how important are valid constructs for providing integrative explanations of cognition? As we aim to show, there are some indications that failure to articulate consistent standards for construct validity can impede scientific progress, but there is also evidence that scientific research can be successful in the absence of such standards.

Disclosures: J.A. Sullivan: None. **M.A. Khalidi:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.11SA/MMM11

Topic: J.01. History of Neuroscience

Title: Sexual differentiation of the brain- a historical perspective of sex differences in neuroscience research

Authors: *G. M. RURAK[1], N. SALMASO[1,2];
[1]Neurosci., Carleton Univ., Ottawa, ON, Canada; [2]Child Study Ctr., Yale Univ., New Haven, CT

Abstract: Sexual differentiation lays at the foundation of mammalian central nervous system (CNS) development. Since the discovery of exogenously administered testosterone by Phoenix et al., in 1959, extensive research has aimed to understand the behavioural, neurobiological and neurochemical influence of sexually dimorphic development of the central CNS. The first critical period of sexual differentiation is defined by the presence or absence of the sex-determining region Y (SRY). First identified by Goodfellow and Lovell-Badge in 1991, SRY is found on the Y chromosome and codes for testis determining factor to influence the development of male-typical external genitalia and subsequently leads to the endogenous production of testosterone during prenatal development. The role of endogenously circulating testosterone being aromatized to estradiol in the CNS and converted to dihydrogen testosterone by 5-α-reductase is largely responsible for the spectrum of masculinization and defeminisation found in the peripheral nervous system, hypothalamus, amygdala and throughout the cortex. The organization-activation hypothesis of sexual differentiation of the CNS is largely based on work done in the mid-20th century by Phoenix et al., and Barley et al., to understand the hormonal and receptor mediated

changes to neuronal density and morphology. The hypothalamus, master regulator of homeostasis and sexual behaviour, exhibits extensive neuroanatomical and neurochemical sexual dimorphism and has been a large focus of Dutch researcher Swaab's work. The roles the hypothalamus plays in sexual behaviour in males and females can largely be explained by the organizational effects of circulating prenatal hormones. More or less misunderstood is the concept of human sexual diversity and the role of the hypothalamus acting in conjunction with sexual dimorphic neurocircuitry and neuronal responses in the cortex. The presence of cytosolic and membrane-bound estrogen and androgen receptors on neurons and glial cells alludes to the sexually dimorphic nature of the telencephalon and other regions beyond the hypothalamus. Although the role of circulating hormones mediating sexual dimorphism in neurons has been explored for several decades, the role of circulating hormones that influence glial cells, mediators of neural circuit formation, have on sexual dimorphism lays at the forefront of sexual differentiation research and is the next frontier of research in sexual dimorphism in CNS development.

Disclosures: G.M. Rurak: None. **N. Salmaso:** None.

Theme J Poster

020. History of Neuroscience

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 20.12SA/MMM12

Topic: J.01. History of Neuroscience

Title: Watson and Guthrie viewed from the 21st century: mechanisms contributing to contiguity-based learning, ocd, ptsd, and addictions

Authors: *S. CURTIS;
True North, LLC, Bloomington, IN

Abstract: In 1924, J. B. Watson proposed that learning occurred simply through repeated pairings of stimuli and behavior. In 1953, E. Guthrie proposed an even simpler theory eliminating the frequency element while emphasizing the recency of previous behavior. In 1998, this author proposed that 'improved efficiency of neural network synaptic transmission with use', i.e., Hebb's Law, could explain this simple bias to repeat behaviors. It was also proposed, however, that sympathetic arousal, e.g., stress or fear, would serve to enhance this 'efficiency bias' for old habits/neural nets by imposing noradrenergic constraints on normal brain blood flow dynamics (i.e., delimited flow-follows-function), and that together, these factors would contribute to the strong bias to repeat old behaviors during stress, e.g., OCD, addictive behaviors, resistance to change, etc. Since that time, there has been substantial evidence from Goldman-

Rakic and Arnsten and others making it clear that even moderate levels of acute stress take Prefrontal cortex and its capacity for creative problem solving 'offline', and with this, lower learning centers such as the amygdala and striatum are left to direct what are most often simplistic, repetitive behaviors, i.e., contiguity learning is expressed. It is also now clear that chronic stress can serve to 'hardwire' this lower brain advantage, with PFC atrophy and lower brain circuit hypertrophy in animal models of PTSD. Finally, it is proposed that, although the monoaminergic dynamics described by Arnsten and others clearly contribute to PFC dysfunction and the release of lower centers, the sympathetic 'delimited flow-follows-function' neurovascular effect described above may serve to enhance both PFC dysfunction acutely and PFC tissue atrophy chronically. Evidence supporting this synergy is reviewed, e.g., excitotoxicity, metabolic vulnerability.

Disclosures: S. Curtis: None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.01SA/MMM13

Topic: J.02. Teaching of Neuroscience

Support: Wells Fargo Foundation

California State University, East Bay Institute for STEM Education

Eden High School

Neuroscience Program, Michigan State University

Title: Game jam with brain bee: steam learning through neuroscience-themed game development

Authors: *J. A. MURRAY[1], I. POLLOCK[2], D. LEAL[2], C. BOBINO[3], E. YEAGER[4], T. J. YAO[4], J. HAIN[4], K. ZIB[4];
[1]Biol Sci., [2]Art, [3]Biol. Sci., [4]Inst. for STEM Educ., California State Univ, East Bay, Hayward, CA

Abstract: This project brought university faculty and students from art and science departments together with high school teachers and students in developing games around a neuroscience theme, bringing two promising programs, Game Jams and Brain Bee to students who have been traditionally underserved in opportunities to participate in engaging STEM activities. University

student teachers met weekly with high school students for mentorship, tutorials, and working on game development in teams. The program prepared high school students to participate in the annual Brain Bee (an SFN sponsored competition), and in a Game Jam (a gathering of game developers for the purpose of planning, designing, and creating one or more games within a short span of time) and culminates with a public presentation of their game development.
The overall goal of the project was to provide a unique opportunity for underserved high school students to participate in a fun, educational STEAM-oriented after school program that would spark their continued interest in STEAM as they gain knowledge and practice in applying it, hone their communication, teamwork, and idea development skills, and see themselves as being able to contribute to a complex project in a way they may not have before. They also built their portfolio for applying to college and jobs through their development of a game and as a Brain Bee competitor.
High school students in our program participated in an intertwined curriculum during their weekly after school meetings that prepared them for Brain Bee (through learning neuroscience) and developed the foundation they needed to make a game (i.e. game making, game theory, and practice with different technologies that could be used in their game development). We began the program in October 2015, with a greater percentage of time (approximately 70%) at the outset spent on preparing for the Bay Area Brain Bee, which was in January 2016. After that, the curriculum was more heavily focused on game development and technology (~70%) in preparation for the High School Game Jam in March. The neuroscience aspect of the curriculum continued, moving towards higher order thinking and application. Participating students were invited to the final presentation of CSUEB's May Game Jam to gain inspiration and participate in networking opportunities.
This unique intertwined curriculum for the program was derived from a Brain Bee curriculum at Michigan State University which was further developed and documented with detailed lesson plans for eventual dissemination and adoption at other school sites. We are assessing the program and participants for increased content knowledge and science self-efficacy.

Disclosures: **J.A. Murray:** None. **I. Pollock:** None. **D. Leal:** None. **C. Bobino:** None. **E. Yeager:** None. **T.J. Yao:** None. **J. Hain:** None. **K. Zib:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.02SA/MMM14

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant EEC-1028725

Title: Precollege participant outcomes for a short-duration field trip outreach program to a neural engineering research center

Authors: *E. H. CHUDLER, K. C. BERGSMAN;
Ctr. for Sensorimotor Neural Engin., Univ. of Washington, Seattle, WA

Abstract: Scientists are encouraged, and often required, to conduct public outreach and community engagement activities. Much of these efforts take the form of short-duration program with pre-college audiences. We measured moderate long-term impacts of students in Grades 4-12 after they attended a field trip program at a neural engineering research center located on a university campus. Student data were gathered using modified versions of the S-STEM surveys (Friday Institute for Educational Innovation, 2012). Student surveys were administered approximately one week prior to the field trip (Pre), at the end of the field trip program (Post), and approximately five to six weeks after the field trip (Post-Post). A total of 7 classes participated in the study, which included 191 students. Preliminary analysis was conducted on a sub-set of data composed of 24 consented students from one middle school class who had taken the survey at all three time points. For this preliminary analysis, we examined three constructs of interest from the survey: Science Attitudes and Engineering/Technology Attitudes (measured on a 5-point Likert scale), and STEM Career Interest (measured on a 4-point Likert scale). For each subject, a composite score was created by taking the mean of the mean scores across all three constructs. A one-way repeated measure ANOVA was used to test whether the subjects' composite scores differed between survey time points. Results showed that there was a significant main effect of survey time point on subjects' composite score, collapsed across all three constructs, Greenhouse-Geisser Adjusted $F(1.51, 34.63) = 5.00$, $p = 0.019$, partial $\omega^2 = -0.02$. Follow-up paired t-tests among the timing of the surveys (using a Dunn-Sidak adjustment to control Type I error to 0.05) revealed that post-surveys yielded higher scores than did pre-surveys at a level that was near significant, $t(23) = -2.54$, adjusted $p = 0.054$, $d = -0.05$. No other significant differences were found between pre-surveys and post-post surveys nor between post-surveys and post-post surveys (t-test p-values > 0.05). Future analysis of the full sample of students (N = 191) will increase the power of the study. The results suggest that participation in the field trip may promote increases in positive students' attitudes about science and engineering/technology and interest in related careers, but that these outcomes may not hold over to the six weeks post-intervention. Further analysis of the full sample will provide additional insights.

Disclosures: **E.H. Chudler:** None. **K.C. Bergsman:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.03SA/MMM15

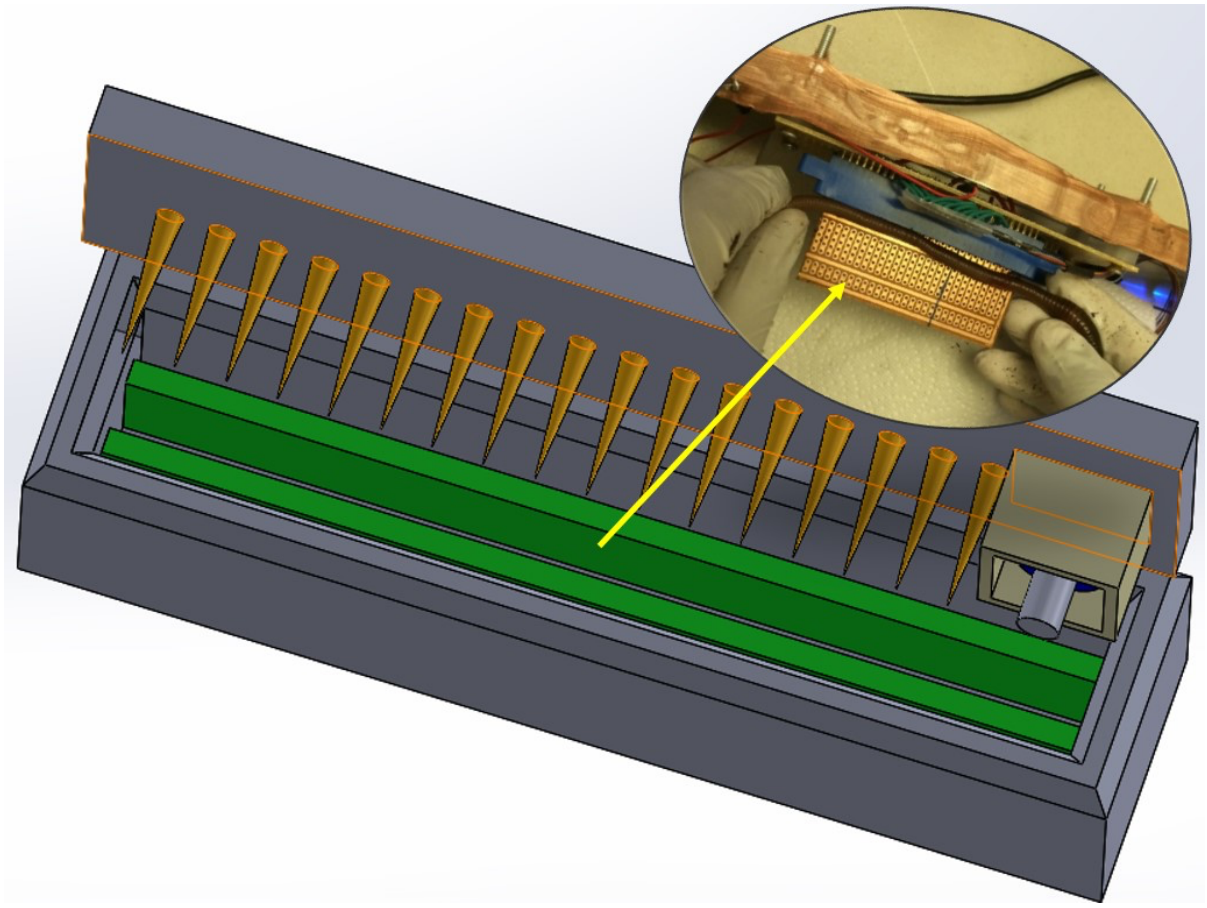
Topic: J.02. Teaching of Neuroscience

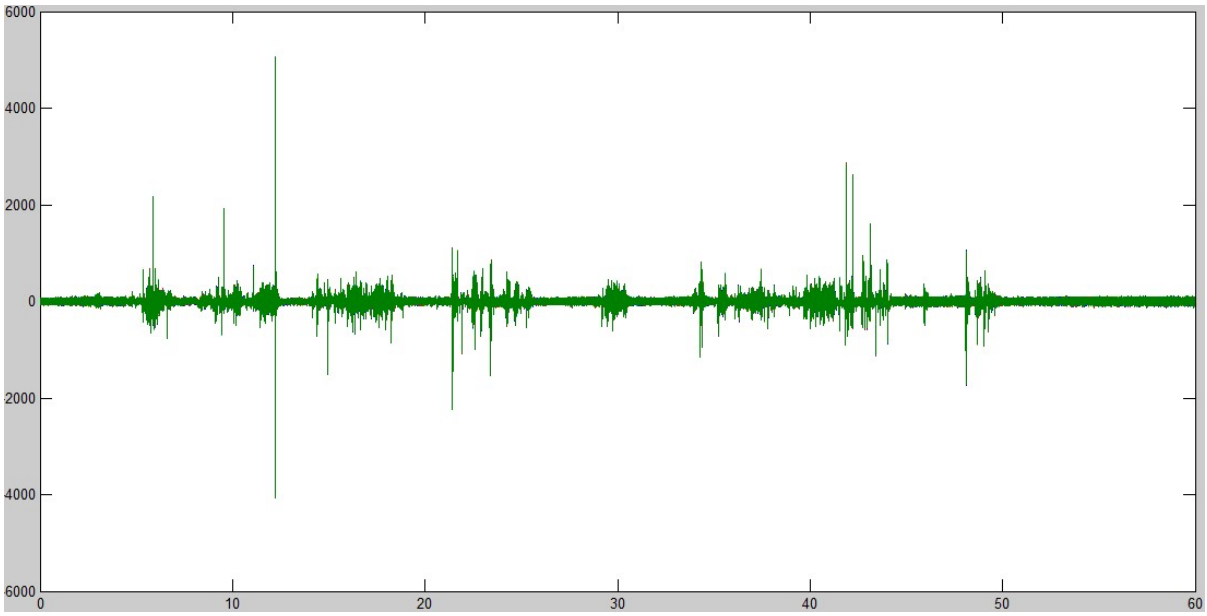
Support: NIH Grant R43MH104170

Title: Development of automated measurement system for neuroscience education

Authors: C. J. COLLINS, 92618[1], *J. COLLINS[2];
[1]Univ. High Sch., Irvine, CA; [2]Biopico Systems Inc, Irvine, CA

Abstract: Development of an automated measurement system for neuroscience
Neuroscience experiments face many problems such as expensive equipment, clinical trials, and time consumption. As a result, many experiments are done by using models and simulations. For example, using earthworms (night crawlers) in experiments to find the action potential recordings of the big fibers of the earthworms avoid the problems mentioned above. An integrated solenoid activator gives the earthworm an automated mechanical stimuli. An electromechanical fixture for the experiment is created. The action potential signal is measured using a 16 channel bio-potential amplifier of an earthworm. The conduction velocity is analyzed for different mechanical stimulus parameters. Common conduction velocity of an earthworm, is 1.2 m/s. Sample frequency of the measuring system is 30 Hz. Pitch of the electrode is 5mm. The time for conduction from one electrode to another is 0.00417 ms.126 data points are acquired between two successive electrodes to calculate the conduction velocity. Further analysis can be carried out by using Matlab program. These experiments help in better understanding of cellular development in nervous system, and could lead to better treatments of neuroscience diseases.
Keywords: Action potential, multielectrode, and Mechanosensory
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3597421/





Disclosures: **C.J. Collins:** None. **J. Collins:** A. Employment/Salary (full or part-time): Biopico Systems.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.04SA/MMM16

Topic: J.02. Teaching of Neuroscience

Title: Your brain did that!: introducing neuroscience concepts to preschool-aged children with an assessment of effectiveness

Authors: *A. BROWN[1], M. EGAN[2], S. LYNCH[2], D. BUFFALARI[1];
[1]Dept. of Psychology, [2]Dept. of Educ., Westminster Col., New Wilmington, PA

Abstract: Despite a recent movement to teach increasingly younger children about the brain, and evidence that such teaching can be effective, nearly all available teaching resources are focused on students in kindergarten or older. This is despite recent recommendations for increasing STEM education as early as preschool. This project brought neuroscience and education undergraduate students together in an attempt to develop a curriculum for teaching neuroscience concepts to preschoolers. Fundamental neuroscience knowledge was first evaluated in the preschoolers. The program was then delivered to preschool children in a series of presentations and interactive activities, and children's mastery of the material was examined. The activities focused on five core concepts in neuroscience (brain control of body, sensory information understood by the brain, memory, different brain parts do different things, and "automatic" brain functions). A post-assessment interview evaluated whether students exposed to the program demonstrated significant gains in brain-related knowledge compared to the non-enrichment group. Results demonstrated that a single presentation increased retention of concepts regarding the brain, and different activities were differentially effective. This research provides an excellent starting point for others wishing to teach brain concepts to children in this age group. Further, it demonstrates for the first time that preschoolers can learn and retain complex concepts about the brain. Finally, this project emphasizes the benefit of bringing together students from varied background (education, neuroscience) in order to maximize student learning in both the outreach target (here- preschoolers) but also, the undergraduates themselves.

Disclosures: A. Brown: None. **M. Egan:** None. **S. Lynch:** None. **D. Buffalari:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.05SA/MMM17

Topic: J.02. Teaching of Neuroscience

Title: Early Recruitment for Careers in Neuroscience

Authors: N. MYSLINSKI[1], *D. A. SEMINOWICZ[2], A. SKVORTSOV[1], S. GHOSE[1], S. SHAH[1];
[2]Dept of Neural & Pain Sci., [1]Univ. of Maryland, Baltimore, Baltimore, MD

Abstract: The field of neuroscience needs to inspire young students at an early age. Young Neuroscience Clubs of America, or YNCA, is a national student-run organization with the purpose of encouraging high school students to become more involved in neuroscience, and become neurologists, neuroscientists, neurosurgeons, and other brain-related professionals. These goals are accomplished through several methods, including encouraging brain-related science fair projects, publishing a monthly journal, organizing outreach programs, and maintaining a website. YNCA is a network of United States high school neuroscience clubs (Chapters), organized for mutual advantage in organizing national events, promoting brain awareness, advancing the presence of neuroscience in high school classrooms, creating neuroscience clubs around the country, and obtaining grants. There is Chapter, Region and National Student leadership. The YNCA was founded by and is overseen by Dr. N. Myslinski. Many of the students currently leading the YNCA effort are USA Local and National Brain Bee champions. They are motivated and passionate about neuroscience and aim to educate other young students about the subject. The monthly journal includes sections on current research, ethics, neuroscientist interviews, education, and opinion. Students from all over the nation are involved in the program. They organize outreach programs in their local communities to provide opportunities for students interested in neuroscience. The student leaders created a website with basic information about YNCA, details about neuroscience programs for high school students, and a separate neuroscience blog and forum site where students can interact with each other. We encourage all neurologists to support YNCA. Any current neuroscience club that wants to become a YNCA member, any one who wants to start a neuroscience club, or become involved in other ways, contact ynca.info@gmail.com.

Disclosures: N. Myslinski: None. **D.A. Seminowicz:** None. **A. Skvortsov:** None. **S. Ghose:** None. **S. Shah:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.06SA/MMM18

Topic: J.02. Teaching of Neuroscience

Title: The NEUrL Project - neuroscience education for urban learners

Authors: *R. C. WILSON, C. ANDRADE, D. CARRERA, E. GIRON, A. LAWWILL, S. LOW, G. VARGAS, G. VARGAS;
Univ. of Arizona, Tucson, AZ

Abstract: The NEUrL Project is an outreach endeavor by the Neuroscience of Reinforcement Learning (NeuRL) Lab at the University of Arizona. The program has two goals: to introduce cognitive neuroscience to high school seniors and to engage college undergraduates in science teaching and outreach.
To pilot this project, seven undergraduates at the University of Arizona designed a two-week, four-session class to introduce high schoolers to cognitive neuroscience through a series of hands-on activities, discussions, presentations and guided instruction. In addition to learning basic neuroanatomy (e.g. the lobes of the brain) and receiving an overview of the field, students were taught to build their own version of the Stroop Task using a simplified coding tool, Builder View in PsychoPy. The students measured their own performance on the Stroop Task and the program concluded with a discussion of how to analyze and interpret the data, and how to apply cognitive neuroscience concepts to everyday life.
The pilot was run at City High School, a small urban charter school in downtown Tucson, Arizona. Approximately 40 high school seniors participated in the program. The City High students participated in a survey before and after the program to assess their previous knowledge and perceptions about neuroscience concepts, and to gauge their interest in and thoughts about the program. Overall the responses indicated they gained more knowledge about cognitive science, neuroscience and computer programing than they previously had (increases between 1.4 and 2 points on a 1-5 scale) and yielded much a great deal of useful feedback to improve future iterations of the project. In addition to the benefit seen by the high schoolers, all seven undergraduates reported enjoying the project and that the it reinforced their own knowledge of fundamental neuroscience content as well as giving them insights into communicating neuroscience material to inexpert audiences.
Future plans for the NEUrL project include expanding it into a summer session, introducing EEG and eyetracking experiments, and designing a program protocol that can be implemented in other schools.

Disclosures: **R.C. Wilson:** None. **C. Andrade:** None. **D. Carrera:** None. **E. Giron:** None. **A. Lawwill:** None. **S. Low:** None. **G. Vargas:** None. **G. Vargas:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.07SA/MMM19

Topic: J.02. Teaching of Neuroscience

Title: The 2016 world brain bee championship

Authors: *N. R. MYSLINSKI[1], J. MCCALL[2];
[1]Neural and Pain Sciences, 8th floor, Univ. of Maryland Dent. Sch., Baltimore, MD; [2]Spinal Cord Injury Ctr., Heidelberg Univ. Hosp., Heidelberg, Germany

Abstract: Future neuroscientists from around the world met in Copenhagen, Denmark to compete in the 18th World Brain Bee (IBB) Championship coordinated by **Dr. J. McCall.** The Brain Bee is the preeminent neuroscience competition for teenage students. The event was hosted and sponsored by the **Federation of European Neuroscience Societies** in July, 2016. Additional major sponsors from around the world supported competitors from specific countries. Worldwide there are 150 chapter competitions, each one involving many schools. The Chapter winners then compete in their respective regional championships to earn the right to compete in the World Championship. They are tested on their knowledge of the human brain with oral and written tests, a neuroanatomy exam using human brains, a patient diagnosis component, and a neurohistology exam. The regions competing were not known at press time, but the regions that sent their champions to the IBB Championship last year (and their coordinators) were **Australia (Linda Richards), Brazil (Alfred Sholl-Franco), Canada (Judy Shedden), China (Jiangjie Yu), Germany (Julianne R McCall), Grenada (Gail Blackette), India (Seema Raghunathan), Iran (Abbas Hadhparast), Israel (Illana Gozes), Italy (P. Paolo Battaglini), Japan (Tetsu Okumura), Korea South (Seong-Whan Lee), Macau (Thomas Lao), Malaysia (Jafri Malin Abdullah), Nepal (Sarun Koirala), New Zealand (S Louise Nicholson), Nigeria (Polycarp Nwoha), Poland (Elzbieta Malgorzata Pyza), Romania (Cristian Gurzu), Singapore (S Thameen Dheen), Ukraine (Andril Cherninskyi), United Arab Emirates (Sathy Parvathy), and United States (N. Myslinski).** The 2015 winner was **Jade Pham** from **James Ruse Agricultural High School** in Australia. The IBB's purpose is to motivate young men and women to learn about the human brain, and to inspire them to enter careers in the basic and clinical brain sciences. **Dr. N. Myslinski** founded the IBB in 1998 with 12 local chapters in North America. An estimated 20,000 students compete annually. More than 100 newspapers, radio and television stations cover the IBB and the student competitors at each stage of the competition, and about 50 web sites are devoted to the Brain Bee. Presidents, Ambassadors and other public officials have recognized the IBB. Many former competitors are now working in neuroscience, neurology, psychology and related fields. The Brain Bee is building better brains to fight brain disorders. We encourage neuroscientists and educators around the world to start a Brain Bee competition in their cities.

Disclosures: N.R. Myslinski: None. **J. McCall:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.08SA/MMM20

Topic: J.02. Teaching of Neuroscience

Support: NIMH SBIR 5R44MH096674-04

Title: iNeuron®: a neuronal circuit building app for high school classrooms

Authors: *J. M. DUBINSKY[1], K. SCHLEISMAN[2], M. MICHLIN[3], R. F. LIE[4], H. SHACKLETON[5], A. SCHWERDFEGER[5], M. MICHALOWSKI[5], S. GUZEY[4];
[1]Dept Neursci, Univ. of Minnesota Dept. of Neurosci., Minneapolis, MN; [2]Dept Neursci, [3]CAREI, Univ. of Minnesota, Minneapolis, MN; [4]Dept. of Curriculum and Instruction, Purdue Univ., Lafayette, IN; [5]Andamio Games LLC, Adventium Labs, Minneapolis, MN

Abstract: iNeuron® is an interactive neuroscience-based application for iPads developed to teach neuroscience and mental health concepts via exploratory and investigative learning. iNeuron® models neuronal, synaptic, and circuit functions and provides an engaging, hands-on, problem-solving learning environment using mobile devices now common in classrooms. Foundational neuroscience knowledge and key concepts are acquired and reinforced as students complete circuit building challenges. iNeuron® contains problem-solving challenges in which students rearrange and connect neurons to make motor and sensory circuits and then modify them by applying concepts such as thresholds, firing periods, inhibition, and feedback loops. Students also solve challenges that model synaptic communication and how synapses change through learning. A teacher dashboard application allows teachers to customize content to classrooms and monitor progress while interacting with students. As students engage in solving challenges, they deepen their understanding of how their own brains control bodily and cognitive functions and change with learning.
iNeuron® provides both individual and group-based modes of play. In group challenges, each device represents a subset of the pieces needed to successfully complete the challenge. To evaluate the effectiveness of iNeuron® on student learning we deployed it in 17 classrooms with over 300 diverse students. All teachers were trained in neuroscience and iNeuron® use during a 2 week BrainU workshop in summer 2016. Learning was assessed with a 10-item multiple choice content test in the class periods immediately before and after 2 days of iNeuron® play. Control teachers taught their own neuroscience lessons; their students did not use iNeuron®. Students played iNeuron® individually or individually progressing into group play. Within each of these conditions play progressed linearly through the sequence of challenges or non-linearly as students explored on their own. Pretest scores from all five groups were equivalent. Students in all conditions learned neuroscience, with significant gains on posttest compared to pretest scores.

Posttest scores of students working linearly and individually were significantly greater than those of control students, indicating game play aided learning. These preliminary findings demonstrated iNeuron®'s positive impact on student outcomes. Analysis of keystroke data is underway to determine neuroscience misconceptions and common strategies for solving challenges.

Disclosures: **J.M. Dubinsky:** None. **K. Schleisman:** A. Employment/Salary (full or part-time): Andamio Games LLC. **M. Michlin:** None. **R.F. Lie:** None. **H. Shackleton:** A. Employment/Salary (full or part-time): Adventium Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Andamio Games LLC. **A. Schwerdfeger:** A. Employment/Salary (full or part-time): Adventium Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Andamio Games LLC. **M. Michalowski:** A. Employment/Salary (full or part-time): Adventium Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Andamio Games LLC. **S. Guzey:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.09SA/MMM21

Topic: J.02. Teaching of Neuroscience

Support: Wellcome Trust: 088130/Z/09/Z

Wellcome Trust: 106556/Z/14/Z

Title: The Dynamite Van: Exploring dynamic brains in schools

Authors: *R. E. ROSCH[1], T. BALDEWEG[2], K. J. FRISTON[3];
[2]Inst. of Child Hlth., [3]Wellcome Trust Ctr. for Neuroimaging, [1]Univ. Col. London, London, United Kingdom

Abstract: There is a great interest from developmental cognitive neuroscience and neuropsychology to understand the processes underlying cognitive development in children. At the same time, parents, teacher and policy makers are always faced with new claims regarding how neuroscience "*can make your child's brain smarter*". Yet there is confusion about the potential benefits of neuroscience on education. We have aimed to better understand and address this issue, by taking a neuroscience lab out into schools.

As part of a larger study on dynamic brain networks in development, we have therefore set up a mobile neuroscience laboratory in a dedicated "Brain Van" (see below). Using mobile electroencephalography (EEG) equipment to record brain activities in volunteer children performing simple tasks, we have visited a number of schools in London and elsewhere in the UK, aiming to: (1) engage children in neuroscience, and widen their participation in neuroscientific research, and (2) use the opportunity to engage with stakeholders in and around schools to identify how neuroscience can play a role in the current educational environment.

Here we report the feedback and experiences of using mobile EEG technology in the school setting. Specifically, we explore the hurdles encountered and feasibility of this approach to increase participation in otherwise difficult to reach student populations. We report on workshops we have organised in partnership with teachers, to explore issues around neuroscience in the classroom, both in terms of teaching and in terms of influencing educational policy in the UK.
The project has shown that there is a wide interest in neuroscience, beyond the confines of the EEG laboratory. The use mobile brain lab has been key to enthuse school children and teachers about basic neuroscience; it has also proved very informative for us neuroscientists and the direction of our research.

Disclosures: **R.E. Rosch:** None. **T. Baldeweg:** None. **K.J. Friston:** None.

Theme J Poster

021. K-12 Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 21.10SA/MMM22

Topic: J.02. Teaching of Neuroscience

Support: CAPES Postdoctoral Fellow

Title: Contributions of alternative methodologies in cognitive development in students of Brazilian elementary school

Authors: A. PEREIRA, Jr.[1], *M. A. FREIRE[2];
[1]Federal Univ. of Rio Grande do Norte, Natal, Brazil; [2]Hlth. and Society Grad. Program, State Univ. of Rio Grande Do Norte, Mossoro, Brazil

Abstract: Test

Disclosures: A. Pereira: None. **M.A. Freire:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.01SA/MMM23

Topic: J.02. Teaching of Neuroscience

Support: NIH MH106174

Title: Membrane state diagrams make electrophysiological models simple

Authors: *R. LAW[1], S. R. JONES[2];
[1]Neurosci., [2]Brown Univ., Providence, RI

Abstract: Ion channels are ubiquitous in living systems. Through interactions with membrane potential, ion channels both control metabolic events and mediate cell communication. Consequentially, membrane bioelectricity bears on fields ranging from cancer etiology to computational neuroscience. Conductance models have proven successful in quantitatively capturing these dynamics but are often considered difficult, with interpretation relegated to specialists. To facilitate research in membrane dynamics, especially in fields where roles for ion channels are just beginning to be quantified, we must make these models easy to understand.

Here, we show that the membrane differential equation central to conductance models can be understood using simple circular geometry. The membrane state diagrams we construct are compact, faithful representations of conductance model state, designed to look like circular "cells" with currents flowing in and out. Every feature of a membrane state diagram corresponds to a physiological variable, so that insight taken from a diagram can be translated back to the underlying model. The construction is elementary: we convert conductances to angles subtended on the circle and potentials to radii; currents are then areas of the enclosed annular sectors. Our method clarifies a powerful but prohibitive modeling approach and has the potential for widespread use in both electrophysiological research and pedagogy. We illustrate how membrane state diagrams can augment traditional methods in the stability analysis of voltage equilibria and in depicting the Hodgkin-Huxley action potential, and we use the diagrams to infer the possibility of nontrivial fixed-voltage channel population dynamics by visual inspection rather than linear algebra.

Disclosures: R. Law: None. **S.R. Jones:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.02SA/MMM24

Topic: J.02. Teaching of Neuroscience

Title: Design and implementation of an introductory-level neuroscience seminar course for biology majors

Authors: *K. NORTHCUTT;
Biol. Dept., Mercer Univ., Macon, GA

Abstract: Seminars have been successfully used to enhance student understanding of neuroscience and to develop students' critical thinking and analysis skills. Exposing students to this format of learning can be especially helpful early on in their undergraduate career (*e.g.* Willard and Brasier, 2014). However, one significant challenge with leading seminars for students with very little neuroscience-related coursework is that students have very little experience with the foundational concepts or methodology needed to understand and critique scientific literature. In 2013, I designed an elective seminar for Biology majors at Mercer University, with the goal of exposing Biology majors to neuroscience, developing their reading and analytical skills, and improving their presentation skills. The only pre-requisite for the course is the first semester of introductory biology. To ensure that all students are prepared to read, analyze, and discuss scientific literature, I have developed a five-week introduction: we

spend two weeks on neuronal communication, two weeks on the most commonly used neuroscience research techniques, and one week working through a paper together in class and seeing a sample presentation of the article (given by me). Then, students do two rounds of presentations, each over 1-2 scientific articles; the first presentation is done in pairs, and the second one is done individually. After each presentation, students lead a short discussion with the rest of the class. One particular challenge has been narrowing the topics such that students gain more experience and confidence with one area of neuroscience while still allowing students to explore topics that particularly interest them. As a result, I recently required all scientific articles for the first round of presentations to relate to a specific topic that the class voted on during the first week of class, and the second presentation could be on a topic of the student's choosing. Students have responded very positively to the course, and particularly comment that it has enhanced their ability to read and understand primary research articles. They have also said that the format of the class, with a five-week "crash course" and an initial round of paired presentations, helps alleviate some of the stress of giving presentations. Anecdotally, by the end of the semester, students' ability to read and discuss primary literature about neuroscience is similar to what I have observed in most seniors. Therefore, this course has been successful in exposing undergraduates to scientific literature early on in their college career, and facilitating their ability to discuss it.

Disclosures: K. Northcutt: None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.03SA/MMM25

Topic: J.02. Teaching of Neuroscience

Title: Developmental neuroscience and community based learning: deepening understanding and relevance through community engagement and practical application

Authors: *N. STAFFEND;
Dept. of Biol. Sci., Univ. of Notre Dame, Notre Dame, IN

Abstract: Classical developmental neuroscience is rooted strongly in pre- and perinatal nervous system development. However given the abundance of data demonstrating that human brain development continues well into our second decade, I designed a developmental neuroscience course that evaluates brain development from neural tube patterning through late adolescence. Unique to this course design are two factors. First, student exploration of development begins during adolescence and works backwards (adolescence, childhood, pre-/perinatal), rooting the

student as the primary stakeholder in the course content. Secondly, students participate in a semester-long Community Based Learning component that increases content relevance and provides an opportunity for practical application of developmental principals to vulnerable populations within the local community. At the beginning of the semester, each student chooses a community partner that serves a vulnerable population within the community, and is required to dedicate two-four hours of service per week. Community partner populations range from early childhood development centers to juvenile detention centers. Parallel to their service, students are engaged in class through rich in-class discussions of primary literature. Students are then challenged to apply what they are learning in class to the population they serve in the community. Through their service, students learn about the real-life behavioral and environmental challenges of their target populations. Students then synthesize their service and content knowledge to create a novel brain health intervention that is designed specifically to promote positive behavioral change in their target population. Post-course student evaluations reported that the Community Based Learning was not only rewarding, but also enhanced their understanding of the primary course content and the importance of early life environment on brain development. This course structure effectively imparted the skills necessary for the translation of primary literature into practical application by training students how to effectively communicate the conceptual framework behind the primary literature to motivate positive behavioral change in their target population. Perhaps most importantly, this course successfully instilled the value of getting primary science "out of the lab" by educating the lay public regarding the relevance of basic science through service and improvement of community outcomes.

Disclosures: N. Staffend: None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.04SA/MMM26

Topic: J.02. Teaching of Neuroscience

Title: Teaching invention technology program as a new cognitive neuroscience profession for the 21st century technological education.

Authors: *A. EKWERIKE[1,2,3], N. C. M. EKWERIKE[3];
[1]Sci. Med. Res. Institute., Dallas, TX; [2]Behavioral Neurosquatemetry, Inst.Of Neurosci. and BiomedicalResearch, Owerri, Nigeria; [3]MedVentures Alfuncis Invention Technol. Program Inst., Lagos, Nigeria

Abstract: Introduction :Invention technology Program (ITP) is a course study developed as a behavioral Neurosquatemetry that teach individuals the study of cognitive neuroscience, pure and applied STEM (science, technology, engineering and math),statistics', systems engineering, business administration, patent procedures, intellectual registrations,copy right laws, fine arts,Autocads graphic design, computer / information technology. History of science, technology and medicine. Bioethics, law and cultures. This course specializes in professionalizing candidates in becoming inventors called Invention technologists.
Specializing Discipline: A candidate specializes as an Ethical inventor, innovating things that are commonly used or as a Technostronomist, innovating products or devices needed for space explorations,habitations and be engaged in the space science research.
Prospective candidate eligibility: Curriculum is designed to accommodate and offer training to K-12, High School, college, graduates, professionals, uneducated inventors and school dropouts,etc.
Training levels and Duration: Every candidate enters this profession from the workshop training level which lasts 3-5 days. Technician's level training is designed for those without college level education and runs from 3 to 6 months for the basic certificate courses, and 18 months for the advanced technician's certificate course. Technologist's level training is designed for those with technician's advanced certificate or college education and it runs for 6 months as a Basic invention technologist 1,12 months as a Basic invention technologist 2, 18 months as advanced invention technologist, 4 years as a professional undergraduate course,1 year for professional masters and 3 years professional doctoral level training. A board certification & annual continuous education mandatory to all.
Advantages of this course and profession: It engages individuals in making great use of their imagination and creative cognition to orientate and innovate things for the benefit of mankind. It is a concentrated cognitive neuroscience creative course made easy to understand thus breed cognitive neuroscience STEM scholars. .Candidates would start inventing things right from the workshop level training. It creates instant pathway to employment, eradicates poverty, unemployment, crimes and assures professionalizing candidates to becoming inventors, knowing how to manage, market, register,patent,protect their inventions and copyrights,etc,thus making livelihoods as innovators whose works are on innovation,research and developments.
Please visit:www.inventiontechnology.org

Disclosures: A. Ekwerike: None. **N.C.M. Ekwerike:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

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NSFC Grant No.31500927

Title: Teaching Practice and Exploration of Neurobiology

Authors: *F. DING, M. SHEN, Q. HE, Q. CHENG, J. QIU;
Nantong University, China, Jiangsu, China

Abstract: Neurobiology is an important frontier disciplines in the life sciences. It is an interdisciplinary curriculum which is content-rich and comprehensive. Through theoretical teaching and practice, we summarized some ideas and experiences. We combined clinical cases with contents in textbooks. In order to improve the interest of the curriculum, the experimental classes were added. Experiments were arranged according to each different chapter. Students were simulated to participate in scientific research activities and they can take part in scientific research group of the instructor who give the course. We also invited some experts in associated fields of neurobiology to give lectures to our students. As one of the assessments, students were divided into several groups. Each group was arranged to digging into one knowledge point through access to literature and information. One student was recommended to make a presentation in each group and graded by other groups and teachers. We gradually formed the practical and characteristic teaching materials system by developing self-compiled teaching materials as a fundamental. Through these efforts our neurobiology curriculum was granted with the Fine Course of Jiangsu province prize in China. The textbook written by our group was selected to be one of the Jiangsu province elaborate textbooks in China. Some students hope to join in neurobiology research after their graduation. Using these teaching techniques and measures we can make the curriculum more interesting, and improve the quality of teaching.

Disclosures: **F. Ding:** None. **M. Shen:** None. **Q. He:** None. **Q. Cheng:** None. **J. Qiu:** None.

Theme J Poster

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BUILDING SCHOLARS Program

NIH Grant GM109817 (AMK)

Title: Implementation of a brain mapping course-based undergraduate research experience in introductory biology: Impacts on novices' competency and affect

Authors: *C. D'ARCY[1], A. M. MARTINEZ[2], C. E. WELLS[2], A. M. KHAN[2], J. T. OLIMPO[3]; [1]Biol. Sci., Univ. Texas El Paso, El Paso, TX; [2]Biol. Sci., [3]Biol. Sci. and BUILDing SCHOLARS Program, Univ. of Texas at El Paso, El Paso, TX

Abstract: Current reform efforts within the science, technology, engineering, and mathematics (STEM) disciplines have focused on the implementation and evaluation of course-based undergraduate research experiences (CUREs) – opportunities that extend the boundaries of traditional laboratory curricula to promote students' development of scientific reasoning and process skills in their respective domain. Despite increased evidence regarding the benefits of student engagement in CUREs (e.g., increased student motivation, increased ability to "think like a scientist"), such experiences have often centered on research in the cell and molecular sciences or ecology. Therefore, little is known about the objective impact of neuroscience CUREs on students' development of conceptual understanding and affect in the biological sciences. To address this concern, we created and evaluated the Brain Mapping CURE, which exposed novices to fundamental neuroanatomical techniques necessary to examine unknown aspects of the rat hypothalamus. Students' ability to accurately perform these core techniques (e.g., mounting of tissue sections, Nissl staining, immunohistochemistry, parcellation, mapping) was assessed quantitatively using a validated rubric developed in-house expressly for this purpose. Students' attitudes, researcher self-efficacy, and science identity following engagement in the CURE were furthermore evaluated using the Undergraduate Research Student Self Assessment (URSSA) survey. Preliminary data indicate that students developed increased competence in performing neuroanatomical and brain mapping techniques over the course of the term. In addition, URSSA results reflect self-reported increases in experimental design abilities, sense of belonging to a scientific community, and interest in pursuing graduate studies in (neuro)science. Collectively, these findings highlight an integral role of the Brain Mapping CURE in promoting students' development of scientific process skills and affect in the STEM domains and provide a guiding foundation for the future development of CUREs in the field.

Disclosures: C. D'Arcy: None. **A.M. Martinez:** None. **C.E. Wells:** None. **A.M. Khan:** None. **J.T. Olimpo:** None.

Theme J Poster

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Program#/Poster#: 22.07SA/MMM29

Topic: J.02. Teaching of Neuroscience

Title: Stress: In and out of the classroom

Authors: C. ZIMMERMAN[1], *A. FRANSSEN[2], C. L. FRANSSEN[1];
[1]Dept. of Psychology, [2]Biol. and Envrn. Sci., Longwood Univ., Farmville, VA

Abstract: The Psychobiology of Stress is an engaging neurophysiology course that features Robert Sapolsky's Why Zebras Don't Get Ulcers (3rd ed) as the accompanying reader. The core content of the course focuses on how psychological stressors trigger the neuroendocrine stress system, directly altering the physiological health and well-being of the individual. Here, we directly compare the successes and areas for improvement for this 400-level special topics course offered as a face-to-face (F2F) version and as a fully online version in the Psychology department at Longwood University. To assess student perceptions, we used standardized university student evaluations (EvaluationKit) and an 8-question instructor-created reflection assignment. To assess student performance in the different formats, we evaluated scores on same or similar assignments. Current trends in online teaching emphasize activities and engagement (synchronous and asynchronous) beyond the common format of lecture, quizzing, and discussion boards; our data supports the non-traditional activities as most favorably perceived, memorable, time-consuming, and challenging assignments. To continue improve learning outcomes in the online offerings of Psychobiology of Stress, we review additional course materials developed by multiple professors who have taught this course F2F at different levels (100-400), different institutions (3), and in different departments (Biology & Psychology) for potential inclusion in an online format.

Disclosures: C. Zimmerman: None. **A. Franssen:** None. **C.L. Franssen:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.08SA/MMM30

Topic: J.02. Teaching of Neuroscience

Title: Using large-scale brain networks to enhance individual learning outcome of neuroscience in large undergraduate lecture based classes

Authors: *M. L. KIRIFIDES;
Hlth. Sci., Drexel Univ., Philadelphia, PA

Abstract: Support for "Active Learning" in the classroom has been advanced since the 1990s (Meyers & Jones, 1993). Some studies address active versus passive learning in the classroom or small group setting (Haidet et al., 2004; Michel et al., 2009; Street et al., 2015). These studies addressed the classroom approaches to learning and not the student's studying methods. Additionally, many studies have been designed and developed to understand the processes of active learning without associating the anatomical and physiological cortical networks. Large Scale Neurocognitive Circuits of learning have been proposed since the 1990s (Mesulam, 1990). Differences between passive and active in cortical circuits have been suggested by Smith et al., 2009. Five distinct cortical networks in cognition have been proposed and reviewed by Mennon, 2013. This project was designed to expand on the use of Large Scale Brain Networks during active learning and by quantify individual performances using individual active learning methods. Subjects for this project were undergraduate students who were struggling academically in a Neuroscience lecture based class and requested assistance. Students were interviewed and a practical 4 stage protocol was designed for each student. Students were self-directed and were responsible for maintaining compliance of the study plan. For the first stage, the students prepared for the class by printing the presentation slides with accompanying note section. The active process during the lecture focused on taking short concise notes and paraphrasing information into bullet points. The second stage was to organize the information into an outline. This included modifying and supplementing the material by referencing the textbook and online content. This stage supported and reinforced the material presented in class and gave the students reassurance that all the material was covered for the exam. In the 3rd stage, the students listed, charted, or diagrammed concepts, pathways and formulas using paper and pencil, coloring books and/or white board. For the 4th stage, the students participated in an assessment exercise by soliciting assistance from other students or a tutor to orally question and answer important concepts and content using a Self-Assessment document provided. Areas identified as inadequate were then reviewed. At the completion of the course, a follow up interview was performed. In this pilot study (n=3), students who adopted these protocols exhibited improvement in their test scores. This study will be advantageous for students in adopting active learning out of class approach for large undergraduate lecture based classes.

Disclosures: M.L. Kirifides: None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.09SA/MMM31

Topic: J.02. Teaching of Neuroscience

Title: Neuroethics & society - a first-year general education neuroscience seminar

Authors: *M. T. KERCHNER;
Washington Col., Chestertown, MD

Abstract: Many colleges and universities have a first-year seminar program in which entering first-year students must enroll. The Global Perspectives: Research and Writing (GRW) Seminars at Washington College incorporate five key components as learning goals – A Global Component, a Writing Component, a Research Component, a Library Component and a Presentation Component. GRW instructors are drawn from faculty across all departmental majors and enrolments are limited so as to foster open and lively discussion (12-14 students). Incoming students that are interested in neuroscience do not currently have an introductory course designed specifically for them, but are required to fulfill general education requirements in biology, chemistry and psychology. The Neuroethics & Society Seminar was developed to address student interest in neuroscience and has proven to be popular among those students with a wide range of intended majors as well as first-year students that intend to pursue or behavioral neuroscience concentration within the psychology major. Students write and share drafts of weekly reflection pieces based upon readings in peer-review journal articles as well as two thought-provoking texts: *The Ethical Brain* (Gazzaniga, 2005) and *The Trolley Problem or Would You Throw the Fat Guy off the Bridge* (Cathcart, 2013). At mid-semester pairs of students lead discussions of peer- reviewed articles and the class collaborates in the design and implementation of a research experiment related to one of the discussion topic (e.g., the “Lady Macbeth Effect: and “Utilitarian Judgments in Sacrificial Dilemmas”. At the end of the semester, the class collaborates to deliver public poster presentations summarizing the outcome of these experiments. This approach to a first year seminar course in neuroscience may be an option to a laboratory and/or lecture-based introductory neuroscience course.

Disclosures: M.T. Kerchner: None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.10SA/MMM32

Topic: J.02. Teaching of Neuroscience

Title: A new curriculum for green and open neuroscience

Authors: *P. W. TSANG[1,2], M. IKRAM[2], A. LAM[2,3], E. L. OHAYON[2,3];
[1]Leadership Higher and Adult Educ., Univ. of Toronto, Toronto, ON, Canada; [2]Green Neurosci. Lab., Inst. for Green and Open Sci., Toronto, ON, Canada; [3]Green Neurosci. Lab., Neurolinx Res. Inst., La Jolla, CA

Abstract: One of the goals of neuroscience research and education is to convey the broad and interdisciplinary nature of the domains. Neuroscience education should also encourage an investigative approach as well as engage the interactive nature of modern science and technology in the classroom and laboratory. However, these goals can be challenging given the complexity of neuroscience and constant change in the field. In addition, in an attempt to address these challenges, central issues of ethics, environmental and social impact are often overlooked. This pervasive oversight in neuroscience education threatens both the pedagogical aims and ultimately the integrity of the science. Here we report on our experiences developing a green and open curriculum for teaching undergraduate and graduate level neuroscience. The target curriculum includes introductory and advanced material in (a) neuroanatomy (b) neurophysiology (c) neuro-ethics and (d) open research tools. It also includes practical components with (1) ethical literature reviews (2) a research project and (3) community engagement. The curriculum aims to address the issue that students may come from a variety of academic backgrounds and personal life experiences. The content is designed to be delivered through a combination of conventional classroom methods, active research work, self-study, and problem-based learning (PBL) approaches. The content also aims to include advanced seminar courses on: imaging methods, neural computational theory, animal sentience, neurodiversity, and techniques in non-invasive research and health interventions. The curriculum is being developed in a collaborative manner using open science tools and will be housed at: http://greenneuro.org/curriculum/. This project is part of a wider initiative for pursuing new ways of studying the brain that are sustainable, eliminate animal experimentation, connect and contribute to the community, and supports neuro-diversity as well as open science.

Disclosures: **P.W. Tsang:** None. **M. Ikram:** None. **A. Lam:** None. **E.L. Ohayon:** None.

Theme J Poster

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Program#/Poster#: 22.11SA/MMM33

Topic: J.02. Teaching of Neuroscience

Title: Project-based assessment and flipped classroom model in an undergraduate neuroscience lecture course

Authors: *B. S. CARTER;
Neurosci., Oberlin Col., Oberlin, OH

Abstract: What is the best way for undergraduates to learn scientific skills and neuroscience content? How can coursework enable students to apply their learning to their own interests and to prepare for future career opportunities? In attempt to address these questions and goals, an upper level neurodevelopment course was implemented to maximize (1) interaction among students, (2) experiential learning, and (3) engagement of student interests beyond the classroom. Content was primarily delivered by recorded lectures, allowing in-class activities to focus on group activities and discussion (i.e. flipped classroom). Instead of examinations, assessments focused on application of scientific knowledge through projects involving writing and presentations. Science as a process was emphasized through multiple instances of peer review and multi-submission assignments. Career development activities that could be adapted to individual student interests were also included. I discuss the design and outcomes of this course, particularly in terms of student products and feedback.

Disclosures: B.S. Carter: None.

Theme J Poster

022. College Teaching I

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Program#/Poster#: 22.12SA/MMM34

Topic: J.02. Teaching of Neuroscience

Title: Using pond snails to explore post-synaptic potentials in the undergraduate teaching laboratory: reversal potentials and membrane conductance

Authors: S. A. HAUPTMAN, *P. S. DICKINSON;
Bowdoin Coll, Brunswick, ME

Abstract: Most neurons in the buccal ganglion of *Helisoma trivolvis* and other pond snails show spontaneous large compound post-synaptic potentials (psps) as part of the feeding motor pattern. These psps, which are readily recorded with intracellular electrodes, can be either excitatory or inhibitory, depending on the specific neuron that is being recorded and on the phase of the motor pattern in which they occur. By injecting constant current, students can alter the amplitude of the psps and compare psp amplitudes at various membrane potentials. A graph of psp amplitude as a

function of membrane potential can be used to determine whether the psps are inhibitory or excitatory, and the psp's reversal potential. The reversal potential can be compared to ions' equilibrium potentials to suggest which ionic currents mediate the psps. By injecting current pulses longer than the time constant during and between psps, students can determine changes in membrane conductance during the psps by comparing the pulse amplitudes and time constants. If channels are opening during the psps, the voltage changes during the pulses have a smaller amplitude and faster time constant than pulses injected between the psps. Although most of the psps recorded in this preparation are due to conductance increases, students periodically record decreased conductance psps, and are thus able to compare the changes in amplitude as a function of membrane potential in both types of synaptic potentials.

Disclosures: S.A. Hauptman: None. **P.S. Dickinson:** None.

Theme J Poster

022. College Teaching I

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University of California Office of the President ILTI

PPMD

LGMD2i

Title: Transforming a traditional classroom into an engaging online course to advance constructivist learning

Authors: *R. H. CROSBIE-WATSON[1], R. C. CHOE[1], A. ARNDT[3], G. BARNES[2], E. ESHKOL[1], Z. SCURIC[1];
[1]Integrative Biol. and Physiology; Neurol., [2]UCLA Office of Instructional Develop., Univ. of California Los Angeles, Los Angeles, CA; [3]Innovative Learning Technol. Initiative, Univ. of California Office of President, Sacramento, CA

Abstract: We developed PS121, an online upper division undergraduate elective course, to the University of California system and beyond. The goal of the course was to bring undergraduates

into the real world of scientific research, therapy design, and clinical application. PS121 appeals to life science and biochemistry majors pursuing professional degrees in medicine, law, education, and research. We investigated nine video lecture formats by polling 150 UCLA students on their perspectives of teaching effectiveness for each format. Statistical analysis of the survey results identified three lecture video styles that were both engaging and effective for online students. Delivering content by lectures alone (passive learning) is less effective than engaging students in active learning or constructivist experiences. In PS121, we tested several online approaches to promote constructivist learning including asynchronous and synchronous experiences. Asynchronous activities included online discussion in Piazza, short video lectures with embedded questions in Zaption, problem solving on the learning glass, on-site laboratory demonstrations, instructive teaching tidbits, and expert interviews. Synchronous activities included weekly online discussion sections, guided by a Teaching Assistant, peer-to-peer teaching through a collaborative media assignment, and peer evaluation of homework. Assignments were designed to advance higher order thinking on Bloom's Taxonomy by challenging students to create novel disease treatments, to design experiments, and to evaluate treatment mechanisms in preclinical models. Students' exposure to experiences of the disabled community was developed through documentaries and multiple assignments that required interface with the public that were expected to further drive student engagement. Results from the first iteration of PS121 (N=107) on student engagement and perspectives on passive and active learning will be presented in order to advance effective constructivist approaches in online education.

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Theme J Poster

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Topic: J.02. Teaching of Neuroscience

Title: Putting Neuroscience into the Business Curriculum

Authors: M. M. ZENS[1], G. S. LOWRY[4], C. D. WHITE[2], A. FRANSSEN[3], P. T. BARRETT[2], *C. L. FRANSSEN[1];

[1]Psychology, [2]Col. of Business and Econ., [3]Biol., Longwood Univ., Farmville, VA; [4]Economics, Business, & Accounting, Randolph-Macon Col., Ashland, VA

Abstract: Neuroscience research and applications are of great interest to the general public and, increasingly, in academic programs beyond the disciplines that define the science itself. Following an evolutionary path of its own, the study of human behavior has progressed from empiricism to one that connects observed behaviors to biologically measurable conditions, particularly with regard to the brain. Given its long history of behavioral research, it is not surprising, that economics, business, and the allied fields are seeking ways to incorporate findings from neuroscience into their programs. This presentation provides the initial framework used by Longwood University to begin to engage business faculty in neuroscience. The starting point is a workshop where faculty were introduced to the interconnectedness of the fields and provided specific examples whereby they may find connections to their own field of interest. We then discuss ongoing education between neuroscientists and business faculty beyond the initial workshop. Facilitated by established resources such as chapters in extant textbooks (or indeed whole textbooks), readers, articles, syllabi, and course descriptions, business and economics faculty can proceed to explore opportunities to integrate neuroscience into existing courses or programs. We propose that additional support will be required from neuroscientists to provide a basic understanding of the nervous system, leaving the depth of coverage to the needs of the business faculty member and the discipline they wish to explore. We discuss the value of interdisciplinary neuroscience education to business faculty and students. The field of business and economics will be heavily influenced by the achievements of neuroscience research and the market will expect graduates to be prepared in this area.

Disclosures: M.M. Zens: None. **G.S. Lowry:** None. **C.D. White:** None. **A. Franssen:** None. **P.T. Barrett:** None. **C.L. Franssen:** None.

Theme J Poster

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Topic: J.02. Teaching of Neuroscience

Title: Group work enhances comfort with the primary literature more than individual work in a group of undergraduate occupational therapy students

Authors: *A. K. PACK;
Utica Col., Utica, NY

Abstract: The Occupational Therapy cohort at Utica College takes a 200-level course in neuroscience which includes a 3000 page term paper based on primary neuroscience literature. In the past (Pack 2007, 2010) this group has demonstrated increased confidence (measured through use of quotations and number of primary references) in using the primary literature after a series of exercises designed to familiarize them with conventions regarding its use. The Spring 2015 cohort was randomly divided into two groups (n=16 each), with one group performing the exercises in sub-groups of four, while the other group did the exercises individually. Measures of comfort with the primary literature (larger number of citations, lower number of quotes) were significantly better in the first group.

Disclosures: A.K. Pack: None.

Theme J Poster

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Topic: J.02. Teaching of Neuroscience

Title: A college course in neuroscience and religion.

Authors: *W. KLEMM;
Texas A&M Univ. Col. Vet Med., College Station, TX

Abstract: Broadly trained neuroscientists are well-positioned to teach young people how to live the happy and fulfilled life that can come from following the dictum of Socrates: "The unexamined life is not worth living." Socrates, a monotheist, meant that to include understanding the reasoned and unreasoned choices in the religious doctrines that people choose to accept. In today's world, religion and science seem to reside in awkward co-existence or even in bitter conflict. Yet everyone tries to make sense of life, and that goal is sought by both neuroscience and religion. Most college students in the West and in the Muslim world bring their shallow childhood religious instruction to their college classes. Neuroscience can help students realize how their religious views are affected by their biology, conditioning, experiences, culture, education, emotions, and cognitive processes. In turn, religion can provide world views that challenge neuroscience and remind scientists of how much remains unknown and may even be unknowable. This report summarizes the author's three semesters' experience of teaching an upper-division undergraduate course in which students discover how neuroscience and religion inform each other. Enrollment was capped at 25 in a given semester. Enrollees were required to be co-enrolled in an all-on-line, theme-synchronized course in "Core Ideas in Neuroscience." On-line work each week required students to alternately post essays or summaries derived from

published peer-reviewed papers in journals that were either science-based (from 83 journals) or theological (15 journals). All writings had the objective of showing how the one world view might inform the other and were evaluated by all the other students in the class. On Friday of each week, a sub-set of the essays was assigned for presentation by the authors, who led class discussion in concert with the professor's attempts at Socratic dialog. The class is extremely popular with both students and this professor. As one senior biomedical science major put it, "Of all the science classes I have taken, this is the one where I have learned the most about what matters most."

Disclosures: W. Klemm: None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

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Program#/Poster#: 22.17SA/MMM39

Topic: J.02. Teaching of Neuroscience

Title: Evaluating the use of individual electrodes and electrode caps in undergraduate lab courses and student research projects

Authors: *S. M. SHIELDS, C. E. MORSE, D. F. NICHOLS;
Roanoke Col., Salem, VA

Abstract: Electroencephalography (EEG) is a common neuroscience technique that is more accessible to undergraduate programs than expensive techniques such as fMRI and single-cell recording. The use of EEG can provide undergraduates with firsthand neuroscience research experience without taking too many financial resources away from a program. There are multiple types of EEG equipment that can be used, including individual electrodes and electrode caps. This study used surveys administered to students in a neuroscience laboratory course, student researchers, and participants in order to discern which of these two EEG setups is more preferred by undergraduates. Surveys asked about preference, comfortability for participants, difficulty of use, and professionalism on an 11-point scale of -5 to +5, with 0 as a neutral value and higher scores denoting more positive feelings. According to average reaction scores calculated from the surveys, laboratory students seemed to prefer individual electrodes (M=2.63, SD=1.21) over electrode caps (M=1.94, SD=1.59; $t(12)$=2.213, p=0.047). Additionally, when explicitly asked about their overall preference, 9 of the 15 students chose individual electrodes over electrode caps. Researchers' ratings revealed a marginal preference for caps (M=1.75, SD=1.93) over individual electrodes (M=0.25, SD=2.57; $t(4)$=-2.657, p=0.057), and all 5 researchers surveyed chose caps on a discriminate choice question. Participants' ratings of caps (M=2.70, SD=1.34)

and electrodes (M=2.56, SD=1.56), however, were not significantly different (t(19)=-1.300, p=0.209). These results do not point to a concrete recommendation of one setup over the other but rather suggest that either setup could be a viable option. Therefore, we conclude that programs can comfortably decide which to use based on their own needs and resources as well as the relative advantages and disadvantages of each setup. For example, individual electrodes may be better for low budgets whereas electrode caps may be better for multichannel recordings.

Disclosures: S.M. Shields: None. **C.E. Morse:** None. **D.F. Nichols:** None.

Theme J Poster

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Topic: J.02. Teaching of Neuroscience

Support: Grass Foundation Education Award

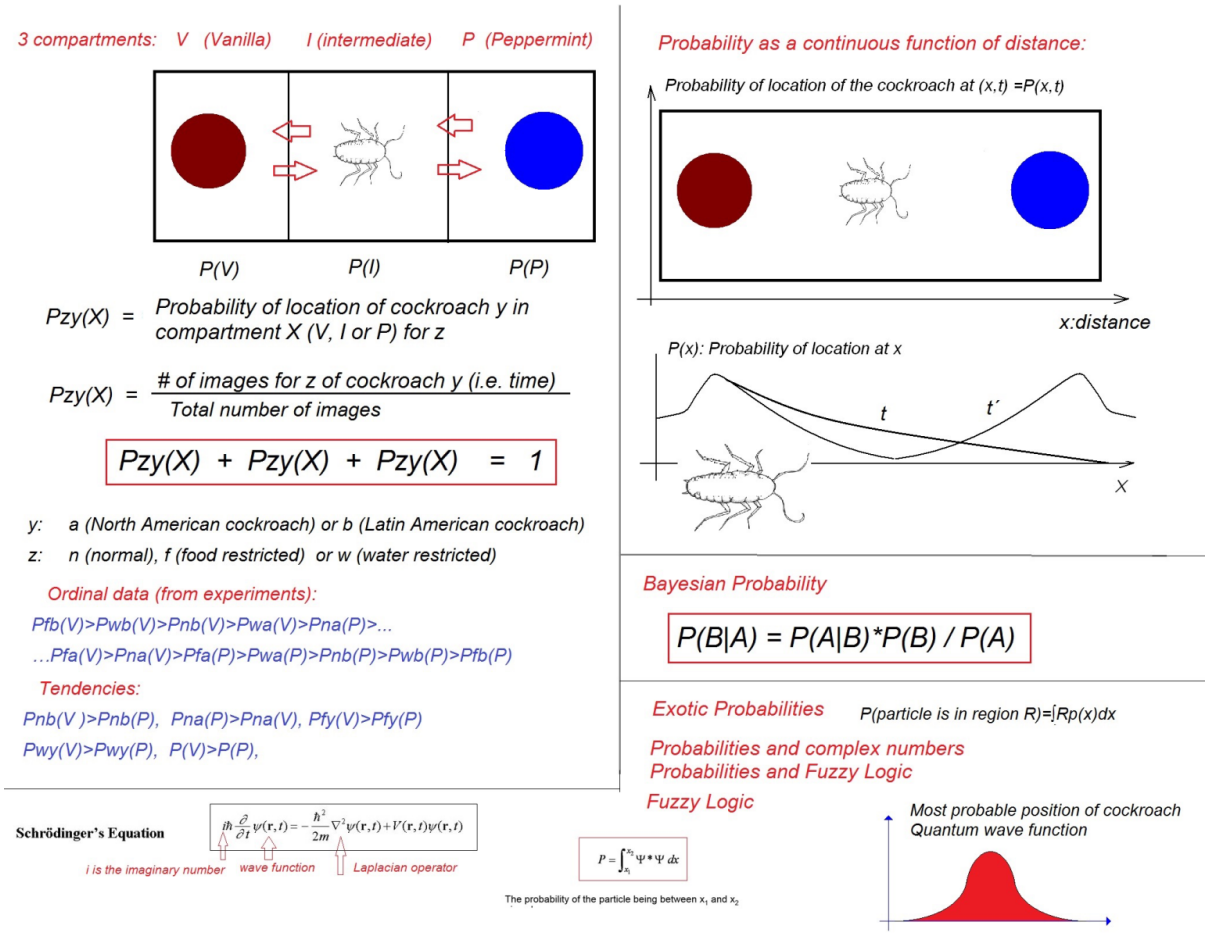
NIGMS1RL5MD009592

Title: Teaching about probability in simple ways: location probabilities, Bayesian methods and exotic probabilities in the context of conditioned place preference with cockroaches

Authors: *U. M. RICOY[1], M. CORREDOR[2], J. F. GOMEZ-MOLINA[3];
[1]Biol., Northern New Mexico Col., Espanola, NM; [2]Inst. de Biologia, Univ. of Antioquia, Medellin, Colombia; [3]Intl. Group of Neurosci. IGN · Intl. Group of Neurosci., Medellin, Colombia

Abstract: INTRODUCTION. The concept of probability has been highly useful in neuroscience. Bayesian approaches are a powerful tool for teaching cognition and behavior. Exotic probabilities have been incredibly successful in quantum physics. Here we explore concepts of probability that can motivate the students in this area. We use Conditioned Place Preference (CPP), a form of Pavlovian conditioning that estimates the motivation properties of a stimulus related to a place. METHODS. We use two species of cockroach (Periplaneta Americana and Blaptica Discoidalis). A total of 20 cockroaches, 10 of each species, were placed one at a time in a single lane of a Plexiglas apparatus with vanilla and peppermint. Each session was recorded from a top and side view for approximately two minutes; one minute ten second video sessions were analyzed at a later time for the amount of time spent on each compartment X of the apparatus (X= Intermediate, Vanilla, or Peppermint). Video files were processed frame by frame. The probability of location P(X) of the cockroach in X is calculated as the number of samples in

which the insect was found in X divided by the total number of samples. CONCLUSIONS. 1. This scenario is a powerful teaching tool to explain elemental concepts of probability to undergraduate students. 2. P(X) can be estimated from samples at different intervals: the faster the speed of the cockroach the smaller the interval should be. At longer intervals P(X) can be considered a continuous function. 3. Conditional probabilities and Bayesian methods can be applied to explain CPP. 4. The use of "exotic probabilities" using fuzzy logic, complex variables or probability waves (Gomez-Molina, 2003, 2015 http://www.medical-hypotheses.com/article/S0306-9877(02)00299-2/abstract http://repository.eia.edu.co/revistas/index.php/BME/article/view/732) can transmit to the students the excitement of applying quantum-like mathematics to the brain.



Disclosures: U.M. Ricoy: None. **M. Corredor:** None. **J.F. Gomez-Molina:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.19SA/MMM41

Topic: J.02. Teaching of Neuroscience

Support: R01AG041135

R01NS075541

R01AA020992

UT Austin CNS Collaborative Teaching Award

Upside of Down

DSACT

Title: Reverse-inclusion courses in science subjects aimed at adults with intellectual and developmental disabilities

Authors: D. GUZMAN, J. SCANLON, T. SHETRON, K. HUCKLEBERRY, S. NORDQUIST, K. CEMPER, *J. T. PIERCE-SHIMOMURA;
Univ. of Texas at Austin, Austin, TX

Abstract: Although great strides have been made to encourage female and minority students in STEM fields, people with intellectual and developmental disabilities (IDDs) have been left behind. To address this problem, we founded an educational program at UT Austin focused on science and aimed at adults with IDDs. Our courses combine opportunities to socialize with college students, participate in interactive discussion with universal learning techniques, conduct hands-on experiments, and give respite for parents. Courses in neuroscience and other college-level topics are offered year round, serving 200 adults with IDDs annually. For each course, lessons are modified to allow 7 UT Austin students to learn alongside 14 adults with IDDs on topics new to both groups. This reverse-inclusion approach enables the adults with IDDs and college students to simultaneously mentor one another. The student volunteers mentor the adults with IDDs by modeling appropriate classroom behavior and by aiding learning. Following each course, however, college students report a paradigm shift in thinking about individuals with IDDs. By befriending them, students witness what adults with IDDs are really capable of learning and contributing in the classroom. Adults with IDDs often have a richer life experience than typical college students in medicine, travel, sports, art and work. College students also witness their unexpected troubles. For some individuals, memory may be impressive, but simple math impossible. Lastly, students come to understand how much they share in common with people with IDDs. Spending time getting to know adults with IDDs teaches students much more about neuroscience and human potential than they could ever learn from a textbook. At the end of each course, adults with IDDs deliver an oral presentation on their experiments to family and guests. Family members often tear up once they realize that their child, for whom they've been conditioned to have low expectations, is contributing to original research. Society has much to

gain by opening college doors to adults with IDDs. Adults with IDDs can gain self-esteem from learning college-appropriate topics. College students can learn about the nature and basis of IDDs first hand while getting to know these people as individuals.

Disclosures: **D. Guzman:** None. **J. Scanlon:** None. **T. Shetron:** None. **K. Huckleberry:** None. **S. Nordquist:** None. **K. Cemper:** None. **J.T. Pierce-Shimomura:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.20SA/MMM42

Topic: J.02. Teaching of Neuroscience

Title: Using assessment strategies to adapt a traditional neuroscience lecture to hybrid format

Authors: *J. D. OMELIAN, S. I. SOLLARS;
Psychology, Univ. of Nebraska at Omaha Dept. of Psychology, Omaha, NE

Abstract: Hybrid courses, with their mix of traditional and online content delivery, are highly appealing; students appreciate the increased scheduling flexibility, instructors can create and deliver content not otherwise available in the traditional classroom setting, and administrators favor the ability to increase student enrollment capacity. While merely creating online coursework can be a daunting task, converting existing material from traditional lecture to online formatting faces its own unique challenges. We demonstrate three primary steps for transitioning an existing class into a hybrid course. First, instructors must identify which aspects of the course are best delivered in the online environment by examining the desired educational outcome for each content area. Previous research has shown that online instruction is particularly useful for content requiring lower level thinking skills (e.g., memorization, understanding and simple interpretation), while material utilizing higher order skills are best reserved for the traditional face to face classroom setting. Second, when transitioning lecture material to an online format, the aim is to convert contact hours from the classroom to online delivery, rather than merely adding an online component to existing coursework. There are several pedagogical and practical considerations associated with this process, primarily relating to access to appropriate technology for both instructors and students. For example, delivering online content blocks in short, 5-10 minute streaming videos has been found to best accommodate student attention and learning, and also minimizes the technological requirements (e.g., reduced the bandwidth requirements), a critical consideration for rural or distance learners. Such transitions of lecture material to an online format can be technically challenging and time consuming, often involving much more demanding work than it initially seems. Third, instructors must evaluate student learning and

engagement for each aspect of the course. Departmental, College or University assessment guidelines are often vital to help shape a course to meet quality standards for student learning that also satisfy assessment requirements. We demonstrate how to apply these steps and create hybrid content which encourages student learning without sacrificing content or clarity. Using a Behavioral Neuroscience course lecture as an illustrative example, we convert a traditional lecture into a series of short video vignettes, using low-cost screen capture software and online delivery platform.

Disclosures: J.D. Omelian: None. **S.I. Sollars:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.21SA/MMM43

Topic: J.02. Teaching of Neuroscience

Title: Designing a hands-on brain computer interface laboratory course

Authors: *B. KHALIGHINEJAD, L. LONG, N. MESGARANI;
Columbia Univ., New York, NY

Abstract: Brain-computer interfaces (BCI), devices and systems that interact with the brain, are a rapidly growing focus of research and development. Although engineering students are well positioned to contribute to both hardware development and signal analysis techniques in this field, BCI and neuroscience have been left out of most engineering curricula. Electroencephalography (EEG) provides an affordable, noninvasive measure of neural activity using scalp electrodes to measure the electrical activity of the brain, making it popular for BCI applications. To bridge the BCI gap in engineering curricula, we developed an EEG-based BCI laboratory course designed to educate engineering students with hands-on experiments. The 3-credit, 35-hour course is offered to senior undergraduate and graduate students jointly by the Biomedical Engineering, Electrical Engineering, and Computer Science Departments of Columbia University in the City of New York. Through interactive laboratory, homework, and project assignments, the course provides an effective introduction to the skills required in the field of BCI.
Our course learning objectives included the following:
1) Experimental design, including experiment design and optimization, data collection and quality control, and hypothesis testing.
2) Neuroscience concepts, including the neural mechanisms of EEG, biological artifacts, event-related potentials (ERPs), and neurofeedback.

3) Data analysis, including finite impulse response (FIR) filtering, linear discriminant analysis (LDA), the fast Fourier transform (FFT), and common spatial pattern (CSP) filters.
4) Technical skills, including EEG hardware and software, MATLAB, and Simulink.
Every week, students heard a thirty-minute lecture to provide background and context, then completed a hands-on EEG experiment requiring about two hours of lab work. Students submitted weekly lab reports and homework designed to teach concrete skills and concepts, as well as two project reports designed to encourage more in-depth experiment design and analysis. Student surveys show that the course successfully met student goals. Overall, our course successfully created enthusiasm among engineering students about the traditionally underrepresented field of neuroscience and equipped them with skills to contribute to the advancement of neural signal processing.

Disclosures: B. Khalighinejad: None. **L. Long:** None. **N. Mesgarani:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.22SA/MMM44

Topic: J.02. Teaching of Neuroscience

Support: Biotechnology Program

ZIA-ES-102805

Title: Mapping the brain with the next generation of neuroscientists

Authors: *Z. A. JOHNSON[1], N. R. SCIOLINO[2], N. W. PLUMMER[2], P. JENSEN[2], ***S. D. ROBERTSON**[1];
[1]Biotech. Program, Mol. Biomed. Sci. Dept., North Carolina State Univ., Holly Springs, NC; [2]Neurobio. Lab., Natl. Inst. of Envrn. Hlth. Sciences, Natl. Inst. of Health, Dept. of Hlth. and Human Services, Research Triangle Park, NC

Abstract: The field of neuroscience is evolving at an unprecedented pace due to technological advances and recent large-scale, national and international initiatives such as the BRAIN initiative. The BRAIN initiative, which was launched by the White House in 2013, rivals the Human Genome Project in scale and promises to propel neuroscience research forward through the development of innovative neurotechnologies. This rapid evolution of modern neuroscience raises the important question of how to best train tomorrow's neuroscientists. Here we describe a novel research-based course, *Mapping the Brain*, with a unique approach to neuroscience

education. The goal of the course is to introduce undergraduate and graduate students to emerging technologies in neuroscience. The half-semester course is offered through the North Carolina State University Biotechnology program and consists of weekly laboratory and lecture sessions. In lecture, students compare traditional and cutting-edge neuroscience methodology, analyze primary literature, design hypothesis-based experiments, and discuss technological limitations of studying the brain. In the laboratory portion of the course, students first explore basic neuronal signaling properties using cockroaches and the classroom-friendly "bioamplifier" from Backyard Brains© the SpikerBox^{tm}. For the remainder of the course students pursue a hypothesis-driven, collaborative NIH research project in mice. Using chemogenetic technology (Designer Receptors Exclusively Activated by Designer Drugs-DREADDs) and a recombinase-based intersectional genetic strategy, students map norepinephrine neurons, their projections, and explore the effects of activating these neurons *in vivo*. Each cohort of *Mapping the Brain* students focuses on a unique aspect of the research project and builds on the work of students from previous semesters. Here, we report our assessment of this neurotechnology and inquiry-based course. Achievement of student learning outcomes and student knowledge of *SfN's* core concepts and essential principals of neuroscience is evaluated based on assessment of student work and anonymous pre- and post-course surveys. By engaging students in a neuroscience research project and exposing them to cutting edge technology, we hope to enhance student learning and inspire future innovation in the field.

Disclosures: Z.A. Johnson: None. **N.R. Sciolino:** None. **N.W. Plummer:** None. **P. Jensen:** None. **S.D. Robertson:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.23SA/MMM45

Topic: J.02. Teaching of Neuroscience

Title: Undergraduate neuroscience education in the US: Quantitative comparisons of programs and graduates in the broader context of undergraduate life sciences education.

Authors: *R. L. RAMOS[1], A. W. ESPOSITO[1], S. O'MALLEY[1], P. T. SMITH[2], W. GRISHAM[3];
[1]Biomed. Sci., NYIT-COM, Old Westbury, NY; [2]Math and Natural Sci., Suffolk County Community Col., Brentwood, NY; [3]Psychology, Univ. of California at Los Angeles, Los Angeles, CA

Abstract: The impact of undergraduate neuroscience programs on the broader landscape of life sciences education has not been described. Using data from the National Center for Education Statistics, we found that the number of undergraduate neuroscience programs in the US continues to grow. Within any given institution, neuroscience programs exist alongside a small number of other life science undergraduate programs, suggesting that neuroscience is one of the few major options from which students can choose from in the life sciences. Neuroscience majors constitute a substantial proportion of all life science graduates at many institutions, and in several cases, neuroscience majors were the majority of life science graduates. Thus, neuroscience programs contribution substantially to life science education, and neuroscience is a highly attractive major among undergraduate students where these programs are available. These data have implications for institutions with existing neuroscience programs as well as for institutions seeking to establish a new program.

Disclosures: R.L. Ramos: None. **A.W. Esposito:** None. **S. O'Malley:** None. **P.T. Smith:** None. **W. Grisham:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.24SA/MMM46

Topic: J.02. Teaching of Neuroscience

Support: Howard Hughes Medical Institute Bioscience Education grant

Lehigh University

Title: Transforming connections for success in neuroscience and STEM: A new program for underrepresented students

Authors: *N. G. SIMON[1], V. C. WARE, 18015[2];
[2]Biol. Sci., [1]Lehigh Univ., Bethlehem, PA

Abstract: The demand for a technologically advanced workforce can be met over the next decade if current levels of attrition from STEM majors are addressed (P-CAST, 2012). Our HHMI-supported program goal is designed to improve retention in neuroscience and other bioscience-related fields through curricular reforms and research engagement in team settings. The program has two components that were guided by prior, successful HHMI-supported initiatives that significantly expanded interdisciplinary team approaches in the curriculum and research for undergraduates. 1. BIOCONNECT: COMMUNITY COLLEGE (CC)

COLLABORATIONS TO IMPROVE STEM RETENTION. Agreements between research universities and CC can facilitate the successful transfer of CC students into a university environment. BIOCONNECT will (i) provide Lehigh-sponsored undergraduate neuroscience and bioscience-related interdisciplinary research, mentoring, and STEM student community building experiences for CC STEM students in preparation for graduation and/or successful transfer, and (ii) assimilate transfer students from CCs into the undergraduate research community culture. We expect that BIOCONNECT participants will show increased retention in neuroscience and other STEM majors, advance to CC graduation or transfer at a higher rate, and graduate in STEM. 2. RAPIDLY ACCELERATED RESEARCH EXPERIENCE (RARE): is a pre-admission-to-graduation science immersion program that provides underrepresented students with outstanding scientific skills and preparation for leadership in addressing the complex issues facing neuroscience and the life sciences. The program incorporates four dimensions that we believe are essential for success with students that are underrepresented: an innovative curriculum, a strong sense of identity as part of a community of scholars, addressing cultural issues that can contribute to low success rates, and an understanding of the commitment required to excel in neuroscience and STEM. RARE tests if a comprehensive, evidence-based 4-year approach will improve retention in neuroscience and STEM to greater than 80% among underrepresented students (our current STEM retention rate is ~50%).

Disclosures: **N.G. Simon:** None. **V.C. Ware:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.25SA/MMM47

Topic: J.02. Teaching of Neuroscience

Title: Grey matters journal: a model for neuroscience education and outreach

Authors: ***G. LENZ**, A. BOSMA-MOODY, A. HANS, M. LINDSTROM, E. GRATE, M. POTTER;
Univ. of Washington, Seattle, WA

Abstract: Grey Matters Journal is a quarterly neuroscience publication founded, produced, and directed by undergraduates primarily at the University of Washington. The journal encourages an interdisciplinary approach to neuroscience outreach and promotes effective communication among students in a variety of fields, including the arts, sciences, and humanities. As an organization, Grey Matters has a two-fold mission: first, to design an innovative neuroscience outreach model that promotes scientific literacy among both students at the undergraduate level

and the general public, thus expanding the scientific community; and second, to foster the development of professional, collaborative, and communicative skills among undergraduate students from a variety of disciplines. Over the last few years, Grey Matters has implemented several new approaches to our publication process and outreach model. We have instituted a graduate student review process for submitted articles to ensure the accuracy of our publication and to further develop each author's understanding of both scientific concepts and the process behind research. Additionally, An Evening with Neuroscience, our annual public outreach event where researchers from establishments like the University of Washington or the Allen Institute speak about their work and host audience questions, continues to attract large numbers of attendees with very positive feedback. Moving forward, Grey Matters is working to contribute to the growth of the scientific community by fostering inter-institutional collaborations among undergraduate students and formalizing our efforts into an explicit template to serve as a unique, innovative model for neuroscience education and outreach. Our third publication featured an article from a student at the University of California, Los Angeles and our upcoming eighth publication will also include an article from a group at Whitman College. Over the past year, we have transitioned from a biannual to a quarterly publication cycle, and in turn, have developed a formal template for journal publication so partnerships such as these retain the cohesive and unique nature of our current journal. We have also partnered with students from the Foster School of Business at the University of Washington to create a long-term business model for our organization, and soon plan to make the leap to non-profit status. With the input of authors, editors, artists, and designers, we are fine-tuning an official guide for Grey Matters publications and operations that can be distributed among our pilot partner universities and future collaborators.

Disclosures: **G. Lenz:** None. **A. Bosma-Moody:** None. **A. Hans:** None. **M. Lindstrom:** None. **E. Grate:** None. **M. Potter:** None.

Theme J Poster

022. College Teaching I

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 22.26SU/DP09 (Dynamic Poster)

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant DUE-0618573

NSF Grant DUE-087906

As author I founded a company (Knowledge Growers, Inc.) that produces a product or service related to the work being reported, specifically an eBook published on the Apple iBooks Store. The SfN presentation carefully avoids promoting my eBook, and in

As author I derive a potential royalty stream through Knowledge Growers, Inc. that produced an eBook similar in form to the work being reported.

Title: Write dynamic eBooks to disseminate your neuroscience work to students

Authors: *H. I. THORSHEIM[1,2];
[1]Psychology/Neuroscience, Knowledge Growers, Inc., Northfield, MN; [2]Psychology and Neurosci., St. Olaf Col., Northfield, MN

Abstract: Whether you are a beginning or veteran neuroscientist, outcomes of your work in research or teaching provide excellent portals for students to advance their understanding and appreciation for the breadth and depth of neuroscience. This dynamic poster will help you to get started with your own eBook to disseminate your work using the free Apple eBook software called iBook Author.
The dynamic poster will showcase steps to get started, tips for along the way, and how to proceed to completion. I will share the "know-how" I have gathered from my own successful experience in writing and publishing an eBook to further disseminate my work already published elsewhere (e.g., Thorsheim, LaCost & Narum, 2010; Thorsheim, 2015), based on two projects funded by NSF. The focus of the projects was to develop ways to engage students in investigative psychophysiology neuroscience, and to evaluate their impact on student learning. The projects involved a strong national team of consultants and a partnership with faculty, students and administrative leaders from 52 community colleges in 27 states, including controls. The presentation will include examples of multimedia and highly interactive eBook options that augment the text you write: videos taken with a smart phone; audio clips of explanations you provide such as how to pronounce technical terms; embedded scrolling text such as instructions for classroom or lab; slide presentations that develop points further; galleries of photos illustrating procedures; introductions to technology; call-out labels that explain details of a point the label is directed to; popover links from pictures of objects; glossary of terms; note taking option for the reader to record their thoughts when reading your eBook; feedback links to you the author for questions or comments; hyperlinks to Internet resources; interactive reference lists; links to social media such as Twitter and Facebook for discussion, and, if you wish, interactive review quizzes to help students focus their reading and be reinforced that they understand what they have read.
Thorsheim, H. I. (2015). Experimental psychology. In D. S. Dunn (Ed.), *The Oxford Handbook of undergraduate psychology education*. New York: Oxford University Press, 387-401.
Thorsheim, H., LaCost, H., & Narum, J. L. (2010). Peer mentoring of undergraduate research in community colleges: A "transplantable" model for workshops. *CUR Quarterly, 31*(2), 26-32.

Disclosures: **H.I. Thorsheim:** Other; author of published ebook.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.01SA/MMM48

Topic: J.02. Teaching of Neuroscience

Support: Quinnipiac University

Title: The 29th northeast under/graduate research organization for neuroscience (NEURON) conference held at Quinnipiac University in Hamden, CT

Authors: T. AHERN[1], D. MCQUADE[2], C. FRYE[3], *A. J. BETZ[1];
[1]Psychology, Quinnipiac Univ., Hamden, CT; [2]Biol., Skidmore Col., Saratoga Springs, NY;
[3]State Univ. of New York at Albany, Albany, NY

Abstract: The 29th NEURON conference was held on February 28th, 2016, at Quinnipiac University's Center for Medicine, Nursing and Health Sciences. Quinnipiac now hosts the website for the NEURON conferences, which includes registration, abstract submission, archives of previous talks, resource links, and image galleries (www.quinnipiac.edu/neuron). The 2016 keynote speaker for was Dr. Nii Addy, Assistant Professor of Psychiatry and of Cellular and Molecular Physiology at the Yale School of Medicine, and his talk was titled *Neurobiological mechanisms of substance abuse: cholinergic and dopaminergic regulation of drug craving and relapse*. His research group uses multiple methodologies, including *in vivo* electrochemistry (fast scan cyclic voltammetry), *in vivo* optogenetics, and behavioral pharmacology to investigate the mechanisms of reinforcement learning and motivational control and examining how these mechanisms are altered in psychiatric illnesses. At the conference, students and faculty participated in four workshops, including: Careers in science panel; How people learn: teaching so that students learn with understanding; Using automated systems to quantify behavior; Synaptic changes in development and memory formation. The Tieman and Frye awards were given to students to honor the quality of their work and poster presentations. This year NEURON also partnered with *Nu Rho Psi*, the national neuroscience honor society, which offer a third poster award. NEURON 2016 grew to 103 posters, representing 41 different institutions and 8 states. A total of 321 faculty, students, and affiliates attended the conference. With continued local and regional support from faculty dedicated to student outreach and mentorship, NEURON has continued to expand beyond its original Boston locations to include greater representation from the northeast region.

Disclosures: **T. Ahern:** None. **D. McQuade:** None. **C. Frye:** None. **A.J. Betz:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.02SA/MMM49

Topic: J.02. Teaching of Neuroscience

Support: Faculty for Undergraduate Neuroscience

Title: The journal of undergraduate neuroscience education (JUNE): A peer-reviewed and PubMed listed forum for innovative ideas in neuroscience education

Authors: *B. R. JOHNSON[1], R. A. RAMOS[2], E. P. WIERTELAK[3];
[1]Neurobio. and Behavior, Cornell Univ., Ithaca, NY; [2]Biomed. Sci., New York Inst. of Technol., Old Westbury, NY; [3]Neurosci. Studies, Macalester Colege, Saint Paul, MN

Abstract: The Journal of Undergraduate Neuroscience Education (JUNE) is a peer-reviewed, PubMed listed and open-access journal published by the Faculty for Undergraduate Neuroscience (FUN). JUNE presents articles addressing a wide range of topics focusing on undergraduate neuroscience education. These include innovative course descriptions and their assessments by students, interviews with noted figures in neuroscience, laboratory exercises, outreach activities, and opinion pieces and editorial viewpoints on issues of general concern in undergraduate neuroscience education. JUNE manuscripts also review media and print teaching resources to provide timely and thoughtful evaluations of textbooks, videos, and web-based material for both classroom and laboratory teaching. Also highlighted are discussions of curriculum and professional development, instructions for home production of inexpensive, high quality and sophisticated lab equipment, a series of "amazing" papers in neuroscience, tutorial reviews, and a new feature, "Case Studies", that gives a context to core neuroscience principles. For example, recent articles in JUNE include editorials and opinion pieces on career advice for undergraduate teaching faculty, an update on Nu Rho Psi, the national honor society in neuroscience, developing neuroscience communication in Africa, and a discussion of achieving diversity through greater inclusion of the majority neuroscience community with URMs. Other recent articles address a range of topics: the matriculation of neuroscience majors to medical school, descriptions of new courses based on topics of pleasure/pain and using the BRAIN initiative to integrate core STEM competencies in a neurobiology course, service based projects for alcohol abuse, laboratory studies with EEG recordings, optogenetics, using cultured mammalian neurons to study neurodegeneration and building simple instrumentation for EMG studies. In addition, latest issues include recent textbook reviews and a technical report describing earthworm activity as a model system to collect behavioral data. JUNE seeks submissions in any of the above article formats. Go to www.funjournal.org/ for more details and free access to JUNE articles.

Disclosures: **B.R. Johnson:** None. **R.A. Ramos:** None. **E.P. Wiertelak:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.03SA/MMM50

Topic: J.02. Teaching of Neuroscience

Support: Start-up funds Lewis & Clark College

Title: Divide and conquer: An example of how to incorporate your research into the classroom.

Authors: *N. A. VELAZQUEZ ULLOA;
Lewis & Clark Col., Portland, OR

Abstract: Providing opportunities for undergraduate students to become involved in research is a crucial part of the mission of the Biology Department at Lewis & Clark College. We are encouraged to develop courses in our area of expertise to bring our research program to the classroom. I have developed two courses with a lab component in which I have incorporated parts of my research: BIO100-Pespectives in Biology, for non-majors and BIO380- Behavioral Genetics, an upper-division course. My lab studies the effects of exposure to drugs of abuse during development on adult behavior, and I am interested in elucidating the genetic mechanisms that influence changes on behavior. I use *Drosophila melanogaster* as model organism. Students in BIO100 contributed to a genetic screen for sensitivity or resistance on survival after developmental nicotine exposure. This course had 24 students working in groups of 3. I gave a specific mutant to several students and in this course my students tested 8 different mutant lines and got data from 2 independent experiments. There was high variability in the data collected, but the larger number of samples achieved by adding data from multiple students provided pilot data that I was able to use to train summer students, who analyzed the combined data, identified the most promising candidate lines and replicated the experiments in well-controlled conditions, validating 3 out of 8 mutant lines tested by the students in the BIO100 course. In my BIO380 course students built and troubleshooted behavioral assays for testing the effects of drugs on fly behavior that work with the materials available at the college and with undergraduate students collecting and analyzing the data. My students developed 7 behavioral assays. Most salient this semester were studies that measured the effects of developmental caffeine exposure on locomotion in adult flies, and an assay to test olfactory preference. I will use these assays in the summer with student interns, and based on the results my students obtained with caffeine, I am now planning to incorporate caffeine as a drug of interest in my research program. By bringing exploratory aspects of my research to the classroom, students gain experience in open-ended

research and I am able to run pilot experiments and adjust scientific protocols to working with undergraduate students so summer students in my laboratory can hit the ground running and advance my research program.

Disclosures: N.A. Velazquez Ulloa: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.04SA/DP10 (Dynamic Poster)

Topic: J.02. Teaching of Neuroscience

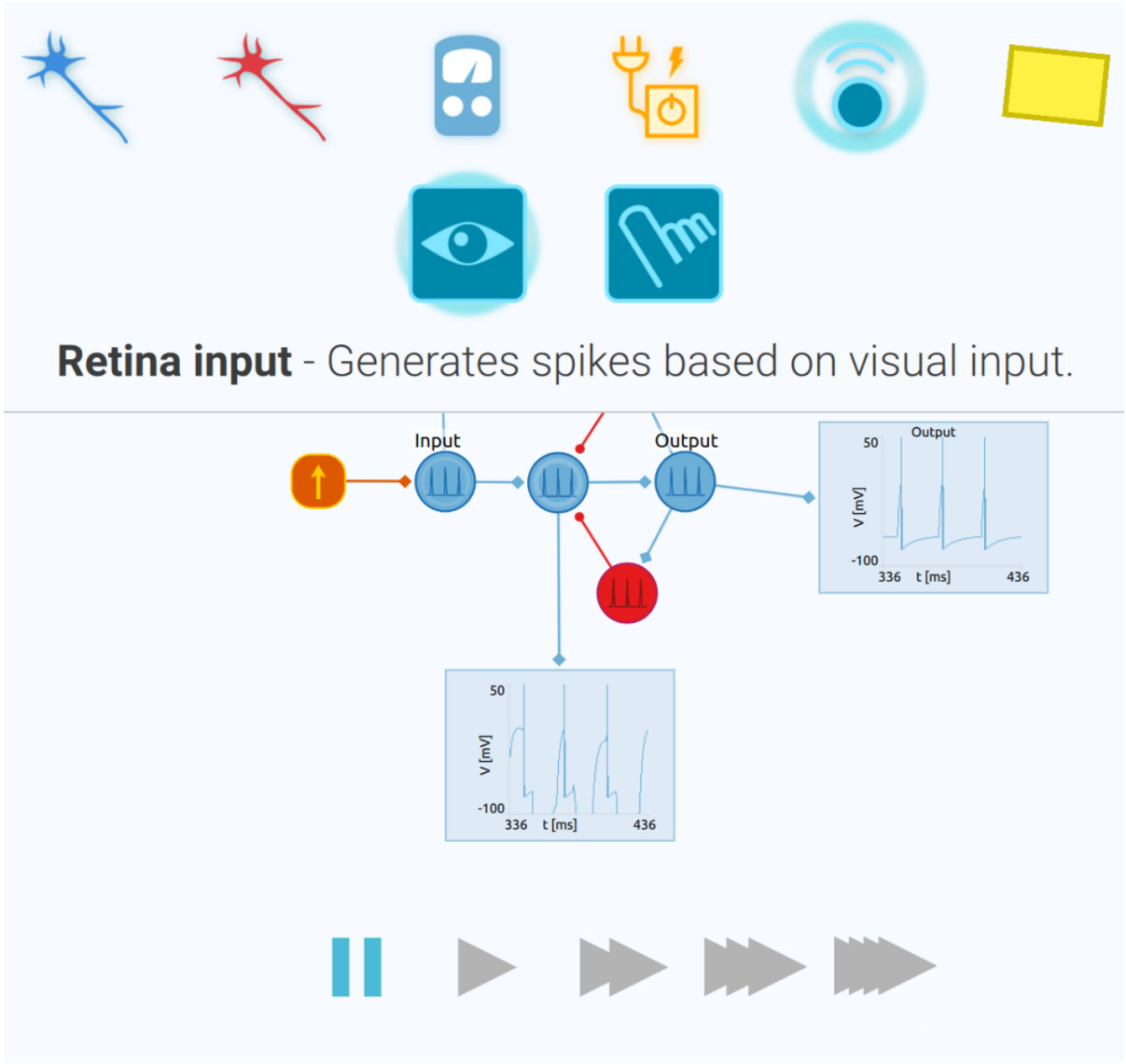
Support: University of Oslo

Title: Neuronify: An educational app for simulation of neural circuits

Authors: *S.-A. DRAGLY[1], M. HOBBI MOBARHAN[2], A. V. SOLBRÅ[1], S. TENNØE[3], H. P. LANGTANGEN[3,5], A. MALTHE-SØRENSSEN[1], M. FYHN[2], T. HAFTING[4], G. T. EINEVOLL[6,1];
[1]Dept. of Physics, [2]Dept. of Biosci., [3]Dept. of Informatics, [4]Inst. of Basic Med. Sci., Univ. of Oslo, Oslo, Norway; [5]Simula Res. Lab., Oslo, Norway; [6]Dept. of Mathematical Sci. and Technol., Norwegian Univ. of Life Sci., Ås, Norway

Abstract: Educational apps can provide an interactive way of learning complicated topics. While such apps exist in many fields, neuroscience has few intuitive and accessible apps made with education in mind. Neuronify is an educational app that aims to fill this void.
Neuronify is based on an integrate-and-fire model of neurons. The advantage of the integrate-and-fire model lies in its simplicity, which makes it an excellent model for an educational app. Building intuition for how neurons and neural networks behave has been a top priority in designing Neuronify. We aim to provide a low entry point to simulation-based neuroscience. Most undergraduate students don't have the computational experience to create their own neural simulator. Neuronify will offer them an opportunity to build their intuition by experimenting with neural networks, in a graphical intuitive interface.
To build and explore neural networks in Neuronify, you drag and drop neurons with adjustable properties onto the app's screen. The neurons are then connected by pulling axons between them. Additionally you can connect neurons to current sources, spike generators and sensors, and record their activity using measurement devices such as voltmeters, spike detectors and firing rate plots. Neuronify comes with a set of small tutorials/network motifs explaining basic properties such as refractory period, adaptation, summation, lateral inhibition etc.

Neuronify is open source and available for Windows, Mac and Linux (Github), Android (Google Play), iPhone and iPad (App Store).



Disclosures: **S. Dragly:** None. **M. Hobbi Mobarhan:** None. **A.V. Solbrå:** None. **S. Tennøe:** None. **H.P. Langtangen:** None. **A. Malthe-Sørenssen:** None. **M. Fyhn:** None. **T. Hafting:** None. **G.T. Einevoll:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.05SA/MMM51

Topic: J.02. Teaching of Neuroscience

Support: Supported by: Virtual Worlds Development Group, Athabasca University.

Title: Online neuroscience educational resources

Authors: *T. H. GILBERT;
Athabasca Univ., Athabasca, AB, Canada

Abstract: Athabasca University (AU) is a leading provider of distance and online education, and is committed to increasing equality of educational opportunity for adult learners worldwide by removing barriers that restrict access to university-level studies. AU's individualized study courses allow students to learn at their own pace, and flexible instruction frees students from the demands of specified class times and rigid institutional schedules. Online learning operates independent of time zones, and location and distance are not issues. In such an environment, it is essential that the educational materials be designed properly to engage the learner and promote learning. This certainly holds particular importance with all levels of science education. Although our students have access to instructors and professors through telephone, e-mail, web seminars, and video conferencing, it still can be difficult to understand fundamental concepts. In order to advance student understanding of essential neurological structures and processes, we have developed a repository of behavioural neuroscience resources. Specifically, these online resources allow students to study neuroanatomy, physiology, pharmacology, and sensation/perception. Significant features of our tutorial website include interactive animations, auditory narrations, and self-tests. These online neuroscience educational resources provide the opportunity to further develop mastery of key neural concepts, mechanisms, and processes. A more recent addition includes a Virtual Behavioural Neuroscience Laboratory (VBNL), enabling an immersive exploration of the tools and equipment of a model lab. Demonstrations will be provided. For a video tour of an earlier version of the VBNL, please visit: http://www.youtube.com/watch?v=W4mnD85rQ3M.

Disclosures: T.H. Gilbert: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.06SA/MMM52

Topic: J.02. Teaching of Neuroscience

Title: "C.r.e.a.t.e."-ing unique primary-source research paper assignments for a pleasure and pain course teaching neuroscientific principles in a large general education undergraduate course

Authors: *R. J. BODNAR, F. M. ROTELLA, I. LOIACONO, T. COKE, K. OLSSON, A. BARRIENTOS, L. BLACHORSKY, D. WARSHAW, A. BURAS, C. M. SANCHEZ, R. AZAD, J. R. STELLAR;
Psychology- Neuropsychology, Queens Col., Flushing, NY

Abstract: A large (250 registrants) General Education lecture course, Pleasure and Pain, presented basic neuroscience principles as they related to animal and human models of pleasure and pain by weaving basic findings related to food and drug addiction and analgesic states with human studies examining empathy, social neuroscience and neuroeconomics. In its first four years, the course grade was based on weighted scores from two multiple-choice exams and a five-page review of three unique peer-reviewed research articles. Although well-registered and well-received, 18% of the students received Incomplete grades, primarily due to failing to submit the paper that went largely unresolved and eventually resulted in a failing grade. To rectify this issue, a modified version of the C.R.E.A.T.E. (Consider, Read, Elucidate hypotheses, Analyze and interpret data, Think of the next Experiment) method replaced the paper with eight structured assignments focusing on an initial general-topic article, the introduction-methods, and results-discussion of each of three related peer-review neuroscience-related articles, and a final summary. Compliance in completing these assignments was very high, resulting in only 11 INC grades out of 228 students. Thus, use of the C.R.E.A.T.E. method reduced the percentage of problematic INC grades from 18% to 4.8%, a 73% decline, without changing the overall grade distribution. Other analyses suggested the students achieved a deeper understanding of the scientific process using the C.R.E.A.T.E. method relative to the original term paper assignment.

Disclosures: R.J. Bodnar: None. **F.M. Rotella:** None. **I. Loiacono:** None. **T. Coke:** None. **K. Olsson:** None. **A. Barrientos:** None. **L. Blachorsky:** None. **D. Warshaw:** None. **A. Buras:** None. **C.M. Sanchez:** None. **R. Azad:** None. **J.R. Stellar:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.07SA/MMM53

Topic: J.02. Teaching of Neuroscience

Title: Research based courses

Authors: L. TOWNLEY, B. OBAYOMI, M. AGRE, *D. P. BALUCH;
Sch. of Life Sci., Arizona State Univ., Tempe, AZ

Abstract: STEM education has been a priority in the United States to ensure there is a pipeline of future professionals who will continue research and education in these fields. It is estimated that by 2020 there will be 8.6 million STEM jobs available with 60% requiring skills possessed by only 20% of the workforce. Statistics such as this emphasis the importance of adequate training which will prepare students to enter the workforce. In the field of science, research based courses are fundamental in career preparation, providing students with hands-on training and experience. One of the shortcomings of many lab-based courses is that they are of the "cookbook" type which limit the investigative process. As students become more advanced, it is important to introduce training in techniques that are used in basic research as well as the investigative reasoning for developing and interpreting research projects and the data collected from them. The research based course not only provides standard curriculum objectives but also adds a lab component that is similar to working in a research laboratory. At Arizona State University, the Cell Biotechnology [BIO451] course was developed in 2000 in a research based format and not only covers the standard course content but also teaches students to how to culture and maintain neuroblastoma cells for weekly experiments where they learn cutting edge techniques such as immunocytochemistry, DNA transfections, histology, FISH and microscopy. This poster summarizes some of the techniques and labs that are conducted within this course, detailing how they are developed, implemented and assessed.

Disclosures: L. Townley: None. **B. Obayomi:** None. **M. Agre:** None. **D.P. Baluch:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.08SA/MMM54

Topic: J.02. Teaching of Neuroscience

Support: Northeastern University - Center for Advancing Teaching and Learning Through Research

Title: From 3D Brains to 3D PDFs: Using 3D photogrammetric scanning to increase access to neuroanatomy specimens outside of the laboratory through virtual 3D models

Authors: *R. W. SIKES[1], C. R. BERNARDO[2], J. CHAN[2], E. F. YAVETZ[2];
[1]Dept Physical Therapy, [2]Northeastern Univ., Boston, MA

Abstract: Exploring human brain specimens in neuroanatomy lab is an great way for students to learn the brain anatomy. By viewing multiple brains, slices and other specimens, students better understand the three-dimensional (3D) spatial relations of brain regions and develop an appreciation for the intricacy and variation of brains. Providing access to the specimens, however, is costly in time and facilities. Unfortunately students often feel more stress than wonder during lab since lists of structures to identify in lab are long and lab time is short. Outside lab they study atlases with 2D pictures of brains, but to the novice the atlas "never looks like the brains in lab". In part because the atlas shows the brain from few angles, and brains in lab actually do differ in details. How better it would be if they could just take the brains home to study. Working with physical therapy students, we developed a process using Autodesk 123D Catch® for photogrammetric 3D scanning to transform human brain specimens into virtual 3D models and distribute these models with Adobe Acrobat® 3D PDF viewer. These models can be viewed and rotated in all directions and offer amazing photorealistic viewing that can indeed be taken home. In a spring semester pilot test on one brain specimen, most students (11 of 14) were able to view and rotate the model on their first attempt and identified gyri, sulci and small structures like arteries and nerves on the brainstem. Comments were very positive, e.g. "I would 100% use this. Especially if there were multiple brains to look at and compare". This summer we will test a larger group of student with three whole brains and other specimens including cadaveric skulls showing foramen exiting cranial nerves and arteries, brain slices, pathological specimens and brainstems. Also 3D rendered internal structures including the ventricles and brainstem nuclei and tracts. We expect model availability will improve learning and decrease stress in the students. Other advantages include archiving of interesting or unique specimens and producing 3D atlases of the specimens in lab. This approach would be useful to improve learning of any anatomical structures as well as in other fields such as biomechanics and molecular modeling. Potential limitations include the time to produce and edit the specimens, transference of knowledge to actual specimens and students relying too much on the models before exams. Our future goals are to improve the production process by developing skills in rendering, automation of the photogrammetry, improving the interactivity of the models for quizzing and labeling, 3D printing of the virtual models and viewing the models using virtual reality technology.

Disclosures: **R.W. Sikes:** None. **C.R. Bernardo:** None. **J. Chan:** None. **E.F. Yavetz:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.09SA/MMM55

Topic: J.02. Teaching of Neuroscience

Title: First-year abroad and beyond: pathways and partnerships for international neuroscience study abroad

Authors: *C. A. KOREY;
Biol, Coll Charleston, Charleston, SC

Abstract: The growing international and collaborative nature of neuroscience makes it imperative that students have experiences that prepare them to be successful in an international context. Undergraduate students in STEM fields represent one of the largest and most rapidly growing demographics for study abroad enrollment. We will present our framework through which we engage first-year students in a study abroad experience in Denmark as a first step towards more advanced and longer engagement with Scandinavian culture and neuroscience research. Our first year course introduces Denmark through the lens of the Danish Medical System and their medical registries. We examine what these registries are and how then can be used for research into variety of diseases and disorders of the nervous system. This course provides a stepping-stone to explore these issues in a more significant way by spending a semester studying at the Danish Institute of Study Abroad (DIS) or through a summer course that would be run in partnership with DIS, the Faculty for Undergraduate Neuroscience, and the College of Charleston.

Disclosures: C.A. Korey: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.10SA/MMM56

Topic: J.02. Teaching of Neuroscience

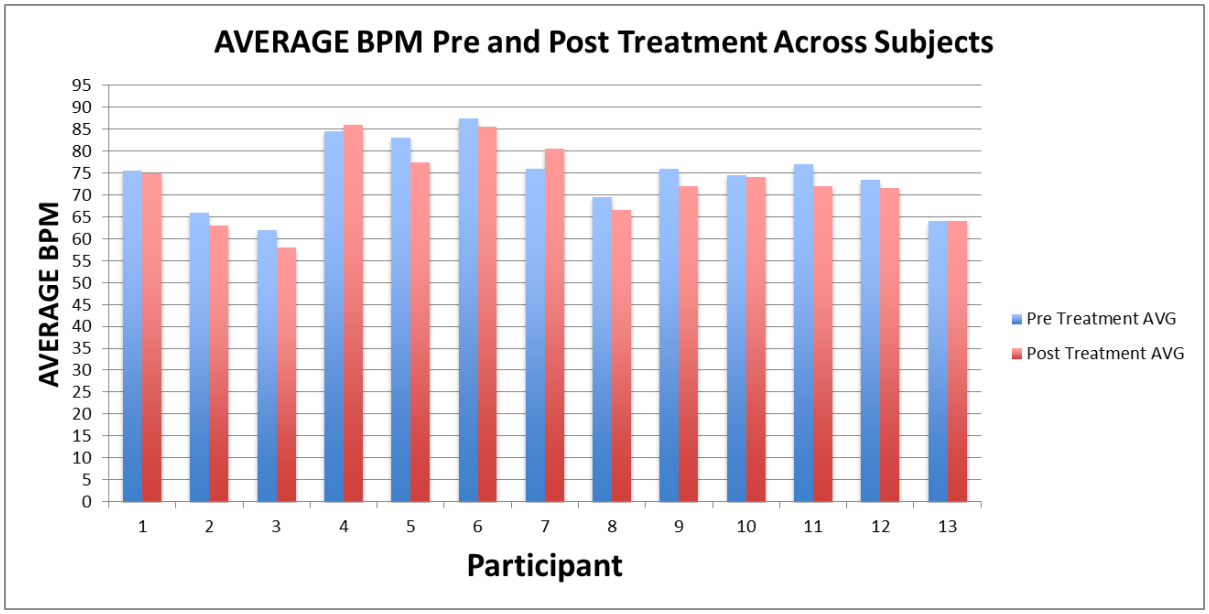
Support: LIU Post Faculty Research Grant

Title: Using an Iphone to teach relaxation skills to undergraduates

Authors: *J. C. NEILL, J. SINGH, N. ZACCONE;
Psychology, Long Island Univ., Greenvale, NY

Abstract: The present experiment was designed to determine the utility of using an iPhone and an application called Cardio to measure heart rate in college undergraduates while they practiced a relaxation technique. 19 undergraduates (8 females, 11 males) served as participants and provided informed consent forms approved by the LIU IRB. Procedure: subjects sat in a relaxing chair in the lab and were trained to record their heart rate with an iPhone using the app, Cardio.

The baseline pulse was recorded by placing the phone camera over the index finger. Subjects then took a deep breath, held it for 10 seconds, and then slowly released the breath while saying "Ohm"; they then took their heart rate with the phone again and recorded the data. They then practiced at home twice a day, morning and night, for 7-10 days. Baseline heart rates and blood pressures were collected in the lab with an Omron (series 10) blood pressure monitor before and after home training. Changes in heart rate before and after daily training were analyzed with a paired t (Excel). Results: There was a significant difference in heart rates (paired t, t=2.18, p < .05, double tailed). The heart rate means (s.d.) were 74.5 (7.73) before daily training and 72.7 (8.46) after training. Heart rates were accurate, as confirmed with the Omron blood pressure/heart rate monitor. Conclusion: The combination of the Cardio app and iPhone are useful for teaching undergraduate students the relaxation response with a rapid, reliable and easy method. The procedure allows students to use an iPhone, which has reinforcing qualities already, and thus lends itself well to this homework assignment. Limitations: In order to protect subject confidentiality, the data was not collected by email automatically, (although the software provides this function). Subjects were required to write down the data and 4/19 students lost data. Thus, it is a good idea to use the automatic data download, and obtain an exemption from the IRB for this purpose. The present experiment extends the iPhone and Cardio as useful for home work experimental settings.



Disclosures: **J.C. Neill:** None. **J. Singh:** None. **N. Zaccone:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.11SA/MMM57

Topic: J.02. Teaching of Neuroscience

Support: Contributions from NeuroScience Associates

Title: Nu Rho Psi, the national honor society in neuroscience

Authors: L. A. BECKER[1], M. J. ZEE[2], G. A. COUSENS[3], D. MOSKOW[4], *G. A. MICKLEY[5];
[1]Univ. of Evansville, Evansville, IN; [2]Northeastern Univ., Boston, MA; [3]Drew Univ., Madison, NJ; [4]Anxiety Disorders Clin., Columbia Med. Center/New York State Psychiatric Inst., New York, NY; [5]Nu Rho Psi, Spartanburg, SC

Abstract: *Nu Rho Psi*, The National Honor Society in Neuroscience, is a non-profit, grass-roots organization comprised of neuroscientists, like you. With more than 65 chapters across the United States and over 3000 members, *Nu Rho Psi* is a dynamic organization that aims to support the professional growth of its members. Most of our members are invited to join *Nu Rho Psi* during their undergraduate training, but qualified graduate students, faculty, and alumni are also welcome to join. Membership in *Nu Rho Psi* is granted exclusively through chartered *Nu Rho Psi* chapters at Colleges and Universities. *Nu Rho Psi* has become a vibrant contributor to the neuroscience community through: (1) encouragement of professional interest and excellence in neuroscience, (2) recognition of outstanding scholarship, (3) advancement of the discipline of neuroscience, (4) encouragement of intellectual and social interaction between students, faculty, and professionals, (5) promotion of career development in neuroscience and related fields, (6) increased public awareness of neuroscience and its benefits for society, and (7) encouragement of service to the community. *Nu Rho Psi* goes beyond providing recognition of excellence in neuroscience scholarship and research. We offer our members a variety of grants and awards including competitive research grants to facilitate senior theses or other scholarly projects. Our chapters may apply for *Nu Rho Psi* Chapter Activity grants to promote their educational and community outreach initiatives. *Nu Rho Psi* members help educate their communities about the *Nu Rho Psi* Theme of the Year. The 2016-17 Theme of the Year is Autism Spectrum Disorder. Members are also eligible for *Nu Rho Psi* travel grants to present their original research at the annual Society for Neuroscience meeting. Schools wishing to foster a chapter of *Nu Rho Psi* may contact the National Office located at Baldwin Wallace University (nurhopsi@bw.edu) and apply for a charter. For more information, see our web page: http://www.nurhopsi.org/

Disclosures: L.A. Becker: None. **M.J. Zee:** None. **G.A. Cousens:** None. **D. Moskow:** None. **G.A. Mickley:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.12SA/MMM58

Topic: J.02. Teaching of Neuroscience

Title: The value of discussing a retracted paper for journal club in an undergraduate neuroscience course

Authors: *K. D. PARFITT[1,2];
[1]Dept of Neurosci., Claremont, CA; [2]Neurosci., Pomona Col., Claremont, CA

Abstract: In journal club discussions for undergraduate neuroscience courses we typically select very strong papers for our students to discuss—often the landmark papers in the field. This allows students to see the turning points in neuroscience history and provides excellent examples of "science done right." Reviewing a paper that had to be retracted can be a very valuable learning tool, however. In an upper-level neuropharmacology course I have used the retracted paper by Ricaurte et al, "Severe Dopaminergic Neurotoxicity in Primates After a Common Recreational Dose Regimen of MDMA ("Ecstasy")" Science, 297:2260 (2002) to discuss the peer-review process, scientific integrity, and the ways in which a single paper can impact public opinion and public policy. For this particular paper, an essay by Simon LeVay entitled "Neuroscience: The Ecstasy and the Agony" from his book entitled When Science Goes Wrong is also a useful basis for discussion. In addition to discussion of how public policies are established, the LeVay article can be a basis for discussing how science is communicated to the lay public. Together these two articles demonstrate to students the potential consequences of rushing to publish before sufficient replication of data.

Disclosures: K.D. Parfitt: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.13SA/MMM59

Topic: J.02. Teaching of Neuroscience

Title: Mind-brain interactions: An introduction to neural plasticity for undergraduates

Authors: *J. G. FOY;
Psychology, Loyola Marymount Univ., Los Angeles, CA

Abstract: As part of their educational experience at Loyola Marymount University, undergraduates are required to take an Understanding Human Behavior course, which includes the course I developed, Mind-Brain Interactions. This goal of the course was to provide students with an engaging introduction to neuroplasticity based on sound scientific research. The primary objective of this course was for students to gain a strong, evidence-based understanding of how the choices we make may influence neural, cognitive and behavioral outcomes, and vice versa, throughout our lives. The evening course, which enrolled primarily non-majors and was open to freshmen entering their first semester, consisted of four modules. In module 1 students were introduced to the brain and neuroscience principles using a flipped classroom approach where they were assigned to view selected video-clips and to study selected articles outside of class and to discuss them in class. During module 2 basic principles of sound scientific research were introduced as well as criteria for judging the validity of empirical studies. In module 3, also using a flipped classroom approach, students were introduced to some major areas of neuroplasticity. In the final module, students presented in small groups on a major topic in applied neural plasticity of their choice (e.g., virtual reality to reduce stress in PTSD patients, meditation to reduce distractibility, music to reduce depression, acupuncture to reduce chronic pain), critically evaluated whether the evidence in the area met the standards for valid scientific research and came to a decision as to whether they would endorse such an intervention, and why or why not. Students worked closely with the professor at all stages during the course to develop their research questions, conduct searches of the scientific literature, and to facilitate their understanding of the reading material. In addition, students were given deadlines throughout the semester to assist with their planning for class discussions and oral presentations and to provide for practice of their final presentations. The course was successful in meeting the learning objectives, which included developing critical thinking skills and increasing their scientific literacy for most students, and was very positively evaluated by the students. Challenges of the course will be discussed, including the diversity in science backgrounds, familiarity with the scientific method, prior experience with and openness to critical thinking, and the typical challenges of working with students in their first semester of college.

Disclosures: J.G. Foy: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.14SA/MMM60

Topic: J.02. Teaching of Neuroscience

Support: HHMI 2010 Undergraduate Science Education Grant to Boston University

Title: Providing an authentic research experience in neurobiology coursework using neuronal differentiation of PC12 cells as a model system

Authors: *K. W. ADAMS[1], M. L. MUSCEDERE[2], P. A. LIPTON[3];
[1]Biol. Sci., Bridgewater State Univ., Bridgewater, MA; [2]Biol. Dept., Hendrix Col., Conway, AR; [3]Undergraduate Program in Neurosci., Boston Univ., Boston, MA

Abstract: Several studies have demonstrated the positive impact that research experiences have on undergraduate learning, attitude, and retention within the sciences, which has fueled incentive to increase research opportunities for students. This was a major motivation behind creating the laboratory sequence described here, which was first developed as part of an undergraduate lecture/laboratory course focused on cell and molecular neurobiology. Goals for the lab design are three-fold. ***Goal 1:*** *To teach students a variety of ubiquitous techniques used in contemporary cell and molecular neurobiology research.* Techniques included in the lab sequence are mammalian cell culture, SDS-PAGE, immunoblot, immunocytochemistry, fluorescence microscopy, plasmid maxi prep, restriction digest, and plasmid transfection. ***Goal 2:*** *To demonstrate the process through which cell and molecular techniques are employed and integrated to investigate questions of relevance to contemporary neurobiology research.* For this goal, students conduct a series of experiments examining molecular events underlying neuronal differentiation, using PC12 cells as a model system. Students begin by examining the effect of nerve growth factor (NGF) on PC12 cell morphology by bright field microscopy, through which they observe neurite outgrowth. They then conduct immunocytochemistry to confirm up-regulation of neuronal marker neurofilament L after NGF treatment. Students then consider signal transduction pathways through which NGF induces PC12 neuronal differentiation and focus on the Ras/Raf/MEK/ERK pathway. To do so, students conduct plasmid maxi prep on an expression plasmid encoding constitutively active Ras-G12V and co-transfect PC12 cells with Ras-G12V + GFP, whereupon they observe neurite outgrowth. Students then conduct immunoblot analysis on their transfectants to confirm overexpression of Ras-G12V. The lab sequence concludes by considering transcription factors (TFs) that function downstream of Ras/Raf/MEK/ERK signaling to drive PC12 differentiation and students conduct experiments to assess one TF in particular—Egr1. ***Goal 3:*** *To teach students how scientists communicate their data through writing and publication.* Having acquired their own data from each experiment, students generate figures and compose text describing them in a format that mimics scientific manuscripts. All together, this lab sequence provides students a research experience that mimics the techniques and intellectual process through which scientists investigate experimental questions relevant to neurobiology and communicate their findings through writing and publication.

Disclosures: K.W. Adams: None. **M.L. Muscedere:** None. **P.A. Lipton:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.15SA/MMM61

Topic: J.02. Teaching of Neuroscience

Support: HHMI Grant U14_IASU

Title: Freshmen research initiative in neuroscience

Authors: *E. J. SANDQUIST[1], B. B. PATEL[1], J. J. ESSNER[1], C. A. OGILVIE[2], D. S. SAKAGUCHI[1];
[1]Genetics, Develop. and Cell Biol., [2]Physics and Astronomy, Iowa State Univ., Ames, IA

Abstract: The Freshman Research Initiative introduces first year undergraduates to authentic research in the STEM disciplines. Projects are embedded into courses (research streams) so that more students can be engaged in research than the traditional one-on-one mentorship model. In this neuroscience-themed research stream, students learned fundamental neuroscience, development, and stem cell biology concepts while assisting in an ongoing lab project investigating the plasticity of adult neural stem cells. Students performed immunohistochemistry and fluorescence microscopy on previously collected tissue to characterize the differentiation potential of neural progenitors in one semester. The freshmen worked in groups of three, performing experiments in parallel. A teaching lab supervised by a graduate teaching assistant and undergraduate peer mentors was open for two, four-hour sessions a week, during which students performed experiments according to their schedules. At weekly lab meetings, students received mini lectures on topics in lab safety, neuroscience, scientific literacy, and research ethics. Freshmen were able to successfully immunolabel tissue using three neural markers and demonstrated understanding of the project goals through the creation of a specific aims page, lab meeting presentations, and the completion of a poster presented at a FRI Symposium at the end of the course. Surveys of the students' experience were completed using the Undergraduate Researcher Student Self-Assessment. Ninety percent of students indicated gains in thinking and working like a scientist, such as formulating a research question that could be answered with data and understanding the relevance of their research to their coursework. In addition, 93% reported personal gains related to research work, such as understanding what every day research work is like and confidence in their ability to do well in future science courses. Future iterations of the course will include an expansion in course size and measures of retention. This course model may be adapted to a variety of research questions in neuroscience, as immunohistochemistry is a prevalent technique in the field, allowing students to make authentic discoveries while gaining knowledge in fundamental neuroscience concepts.

Disclosures: **E.J. Sandquist:** None. **B.B. Patel:** None. **J.J. Essner:** None. **C.A. Ogilvie:** None. **D.S. Sakaguchi:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.16SA/MMM62

Topic: J.02. Teaching of Neuroscience

Support: W.M. Keck Foundation Grant for Initiative for NeuroCulture

NSF CAREER Award 1253126 to SR

Title: Laboratory based undergraduate neuroscience curriculum at a small liberal arts college

Authors: ***S. RAMAKRISHNAN**[1], D. ANDRESEN[2];
[1]Neurosci. Program, [2]Neurosci. Program, Dept. of Psychology, Univ. of Puget Sound, Tacoma, WA

Abstract: At small liberal arts colleges, neuroscience is usually cobbled together with faculty from varied departments with few (if any) dedicated neuroscience personnel. With such limited resources, offering a hands-on lab based curriculum is difficult. Yet, these direct learning experiences are important to ensure that students gain a well-rounded exposure to the vast field of neuroscience techniques and methodology. At the University of Puget Sound, we have modified our introductory neuroscience curriculum over the last two years and introduced a junior-level methods course to provide students with direct experience with a variety of neuroscience laboratory techniques ranging from histochemistry to electrophysiology.
The introductory neuroscience course is co-taught by a biologist and a psychologist, and spans topics in neuroanatomy, cellular neurophysiology, sensory-motor integration, neuropsychology, and cognitive systems. Around 40 students, primarily juniors and sophomores, enroll in the course each spring. No prior neuroscience experience is required. In addition to typical classroom lectures, we have developed several labs which give students hands-on experiences such as sheep brain dissection, action potential simulations, catecholamine histochemistry, clinical cranial nerve testing, Von-Frey hair testing of somatosensation, as well as human neurophysiological recordings using electroencephalography, electromyography, and electrodermal activity (Biopac Systems). Students work in small groups for 1.5 hours each lab to link practical knowledge with the lecture themes.
We have also introduced a *Methods in Neuroscience* course, in which students (juniors/seniors) come together for a weekly 3-hour lab-based class. An online discussion board is used to review

papers ahead of time, and class is only used for hands-on training in various neuroscience methodologies. Beginning with a DIY-microscopy session, students move on to learn staining techniques, cryosectioning, microdissection, recording neural activity using Spiker Boxes (Backyard Brains), and how to implement behavioral assays. Students use the last four weeks of class to develop independent projects in which they use methods learnt to tackle hypothesis-driven research questions or to develop a new technique.
Student responses to these labs have been overwhelmingly positive, and report having a better grasp on the breadth of neuroscience and the scope of the techniques involved. Here, we will detail the syllabi used in these hands-on courses, how the content dovetails with broader neuroscience training, the costs involved, and some student projects that have emerged.

Disclosures: S. Ramakrishnan: None. **D. Andresen:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.17SA/NNN1

Topic: J.02. Teaching of Neuroscience

Title: Faculty for Undergraduate Neuroscience (FUN): Multiple mechanisms for supporting the development of undergraduate students and faculty in the neurosciences.

Authors: *A. STAVNEZER[1], L. CHASE[2], L. GABEL[3];
[1]Col. of Wooster, Wooster, OH; [2]Biol. and Chem., Hope Col., Holland, MI; [3]Psychology and Neurosci., Lafayette Col., Easton, PA

Abstract: Faculty for Undergraduate Neuroscience (FUN) is the international society devoted to neuroscience education at the undergraduate level (www.funfaculty.org). This presentation will provide an overview of our organization, highlighting the work we have done over the past year in 8 different areas of undergraduate neuroscience. 1. Since 1992, FUN, in collaboration with its sponsors, has granted travel awards for undergraduate researchers to attend the annual SfN meeting and present their research. We will list the names, home institutions, corporate sponsors and poster locations of the 2016 travel award recipients. 2. FUN coordinates an equipment loan program, providing researchers with the opportunity to borrow state of the art equipment from associated vendors (see web site for details). 3. FUN supports the online, peer-reviewed, PubMed-indexed Journal of Undergraduate Neuroscience Education (JUNE), which is devoted to the dissemination of teaching and laboratory techniques for use in an undergraduate neuroscience curriculum (www.funjournal.org). 4. FUN collaborates with Nu Rho Psi, the national honor society in Neuroscience. 5. FUN will hold its next triennial faculty development

workshop at Dominican University in the summer of 2017. This workshop brings together educators to develop and share best teaching and laboratory practices. 6. FUN supports regional undergraduate neuroscience research symposia such as “MidBrains”, “SYNAPSE”, “NEURON”, and “mGluRs”. 7. FUN annually recognizes exceptional faculty accomplishments in neuroscience education, mentorship and service at the annual FUN Social. 8. Finally, FUN supports communication and networking among its members through our newsletter and listserve. FUN members and other interested in learning about FUN are encouraged to attend our annual business meeting and the FUN Social and Poster session, held during the SfN meeting. The time and location of these events will be listed on the poster. At the FUN Social, well over 120 undergraduate researchers and their mentors will present their work in a poster session (Sunday, November 13 at 6:45 pm). We will also honor the FUN Student travel award winners, recognize our generous sponsors, and honor faculty award winners.

Disclosures: **A. Stavnezer:** None. **L. Chase:** None. **L. Gabel:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.18SA/NNN2

Topic: J.02. Teaching of Neuroscience

Support: Loyola Marymount University (Core Course Development Grant)

Title: Multiple forms of learning pedagogies used in an upper-division undergraduate behavioral neuroscience course

Authors: *M. R. FOY;
Dept. of Psychology, Loyola Marymount Univ., Los Angeles, CA

Abstract: Behavioral neuroscience explores the scientific investigation and advancement of theory underlying the biological basis of behavior. As an interdisciplinary field, behavioral neuroscience incorporates the findings from scientific research in several key disciplines including psychology, biology, anatomy, pharmacology, physiology, and clinical sciences. The course developed at Loyola Marymount University was designed to provide upper-division undergraduate students a general understanding of how the brain regulates behavior, and how it is influenced by behavioral interactions. In order to offer a comprehensive introduction to behavioral neuroscience, the topics of structure and function of sensory and motor systems, along with the biological basis of higher brain functions such as learning and memory, language, and cognition were first investigated. This was followed by an instruction of common brain-

behavior abnormalities and their treatment because dysfunction of the human brain can produce a wide variety of neurological and psychiatric illnesses. Students became familiarized with basic scientific information to help identify and appreciate mechanistic links and common biological/psychological themes that span several of the primary disorders of the nervous system. Combined traditional lecture and seminar-type active learning pedagogies were used throughout the course. For each weekly class meeting, a lecture was presented at the beginning of the class for disseminating a relatively large body of content, followed by an active learning pedagogy in which students viewed an appropriately-themed audio/visual presentation and broke into groups to discuss pertinent course materials relevant to that week's topic. These methods of instruction were used to emphasize both student interactions with peers, as well as with the instructor, for feedback on discussion was evaluated in a supportive fashion. Students completed a final project focused on a specific behavioral neuroscientific problem or topic of their interest. This project required a critical review of contemporary scientific research relevant to the students' chosen topic, and presented to the class (oral presentation with PowerPoint slides) with the purpose of making sound conclusions based on an understanding of the research and its application to real world problems. The incorporation of both traditional lecture and active learning pedagogies was positively evaluated by students in which many rated an increased level of interest in behavioral neuroscience that was corroborated with strong student performance.

Disclosures: M.R. Foy: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.19SA/NNN3

Topic: J.02. Teaching of Neuroscience

Title: Flipping for neurobiology! developing a hybrid upper division lab

Authors: *A. C. NICHOLAS[1], L. JAVIER[2], N. GOLDBERG[3], V. BOUCQUEY[2], A. WHITE[2], J. OVERMAN[2], J. OCHABA[2];
[1]Dept of Neurobio. & Behavior, Univ. of California At Irvine, Irvine, CA; [2]Univ. of California, Irvine, CA; [3]Unviversity of California, Irvine, CA

Abstract: Online teaching modules were developed by graduate student teaching assistants at the University of California, Irvine to provide supplementary instruction for an upper division undergraduate neurobiology lab. The neurobiology course covered topics of *neuroanatomy*, *electrophysiology*, *scientific writing*, *neuropharmacology*, *behavioral neuroscience* & the *neurophysiology of eeg* in 15 online modules that utilized the new software platform, Rocketmix

(www.rocketmix.com). This online platform allows instructional videos to be interspersed with a variety of embedded assessment questions, providing students immediate feedback about course content and lab procedure. Undergraduate students (100) enrolled in the hybrid lab were required to complete the online teaching modules either immediately before or immediately following participation in the live version of a wet lab. Completion of modules prior to live participation prepared students with a better understanding of protocol and rationale, improving the use of lab time. Completion of modules following lab provided an opportunity to reinforce the methods and topics explored during lab, eliminating acquired misconceptions. Student ratings of likeability for the online modules and performance on exams as it relates to the timing of online module delivery will be discussed.

Disclosures: A.C. Nicholas: None. **L. Javier:** None. **N. Goldberg:** None. **V. Boucquey:** None. **A. White:** None. **J. Overman:** None. **J. Ochaba:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.20SA/NNN4

Topic: J.02. Teaching of Neuroscience

Title: Flipping the classroom for student presentations: Podcasts coupled with on-line discussions

Authors: *M. E. HARRINGTON;
Neurosci Prog, Smith Col., Northampton, MA

Abstract: Encouraging students to engage with primary scientific literature is a key aim for teaching undergraduate neuroscience courses. Students struggle to understand primary literature and to then explain the important points about an article to fellow students. Students can give classroom presentations explaining a journal article, but these presentations are sometimes lengthy and do not always offer the best use of class time. An alternative is for students to prepare a podcast about an article. In a second-year undergraduate course I required students to identify an empirical article to present and to get it approved by me. They then answered a set of 12 questions that can be answered about any empirical report, an assignment I collected and graded. They then prepared a 3-5 min “podcast” on the topic. First they wrote a script, which often included drama, music, interviews, or other creative effects. Students used either Audacity or GarageBand software and were trained in preparing the audio files in a 1 h session. These audio presentations were more concise, entertaining, and informative than I have observed for in-class student presentations in the past. Audio files were posted on our course website. Classmates

were required to listen to the podcast before class, and each student was required to comment and ask questions in an on-line forum. This assignment ensured all students in the class responded to the material being presented, an improvement on in-class presentations in past years. The student who had prepared the podcast led a 10 min classroom discussion, following up on the questions raised in the on-line discussion. I asked students to create 3 podcasts over one semester, with the last one being a portion of the final exam (the article chosen among 3 chosen by the instructor). This approach could be modified to many different classroom settings. Students enjoy the experience and it can serve pedagogical goals better than in-class student presentations.

Disclosures: M.E. Harrington: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.21SA/NNN5

Topic: J.02. Teaching of Neuroscience

Support: Active Learning Initiative at Cornell University

Title: To flip or not to flip? Transitioning a team taught neuroscience course towards active learning

Authors: *L. C. MANELLA, I. BALLAGH;
Neurobio. and Behavior, Cornell Univ., Ithaca, NY

Abstract: In STEM education, buzz words like “flipping” and “active learning” are still controversial. Although research provides evidence that these teaching methods are effective and appreciated by students, many educators and students still question if the benefits of using these methods outweigh the costs of implementation. In this study, I look at how active learning is perceived by faculty and students compared to the learning gains of students who have been exposed to active learning methods. I discuss the common hardships and pitfalls of implementing active learning in a well-established, team taught Introduction to Neurobiology course at Cornell University. Moreover, I provide concrete examples of successful implementation of active learning in and out of the classroom. Specifically, I describe a sheep brain dissection lab that uses prompts throughout the manual to get students to analyze how and why the brain is organized as it is, rather than using rote memorization of brain structures.

Disclosures: L.C. Manella: None. **I. Ballagh:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.22SA/NNN6

Topic: J.02. Teaching of Neuroscience

Title: Incorporating a bioinformatics module into an advanced undergraduate neuroscience course

Authors: *S. LAGALWAR;
Skidmore Col., Saratoga Springs, NY

Abstract: Current neuroscience majors embarking on research and clinical careers will likely incorporate big data such as large scale gene expression analysis into their future research programs and clinical practice. Ideally, students would receive exposure to the tools and principles behind such analysis in their college coursework. To this end, a semester-long bioinformatics module was interwoven into a 300-level course titled "Cerebellum and Movement Disorders"; however, the benefits of such a module is that it can be easily molded and integrated into a number of existing classes. The bioinformatics module was designed with three main goals: 1) to give undergraduate students an appreciation for gene expression analysis in research; 2) to familiarize students with available online software for conducting gene expression analysis; and 3) to task students with independent research projects in which they utilize online gene expression software and analyze their results within the context of a research question. This module was received favorably by students and supports Skidmore College's initiative to offer coursework featuring "digital exploration". The following online databanks were used in the module: NCBI Geo, Allan Brain Atlas, DAVID, and NCBI Pubmed. Links to the project outline and program tutorials will be provided at the poster session. Discussion about this and other bioinformatics modules and assignments are welcome.

Disclosures: S. Lagalwar: None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.23SA/NNN7

Topic: J.02. Teaching of Neuroscience

Support: Emory University Center for Faculty Development and Excellence

Title: Quantitative literacy among non-science majors in a neuroscience course with lab

Authors: K. E. FRENZEL[1], D. KOHLHORST[2], E. LANDIS[3], *L. A. ROESCH[1];
[1]Neurosci. & Behavioral Biol. Program, [3]Grad. Program in Neurosci., [2]Emory Univ., Atlanta, GA

Abstract: For the past 6 years, we have been teaching a neuroscience course for non-science majors titled “From Botox to Behavior: Neuroscience for non-scientists”. While the course has been very successful as measured by student performance on assessments of content learning and student satisfaction, we have noticed a pervasive weakness in quantitative literacy. Although our students learn and apply many fundamental neuroscience concepts, they rarely use data to support their arguments, have difficulties effectively presenting data they collect in lab activities, and struggle to interpret results appropriately in the context of the overall hypotheses. We have tested the effects of three modest but targeted modifications, which require the students to integrate data into the class assignments. Grounded in published literature on quantitative literacy, our study uses quantitative and qualitative strategies to assess student improvement after the modifications. The results from this study will help shape our future teaching of this non-majors course, but will also contribute to the larger literature on science education and quantitative literacy.

Disclosures: **K.E. Frenzel:** None. **D. Kohlhorst:** None. **E. Landis:** None. **L.A. Roesch:** None.

Theme J Poster

023. College Teaching II

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 23.24SA/NNN8

Topic: J.02. Teaching of Neuroscience

Title: The IMPULSE journal: a practical teaching tool for a neuroscience minor

Authors: *R. SLEDGE, *E. MOORE, *H. JOHNSON, *Z. KAPLAN, *S. SNOUSE, *M. PAVELKA, *M. ZRULL;
Honors Col. At Appalachian State Univ., Boone, NC

Abstract: While undergraduate journals are a relatively recent phenomenon, their popularity has grown significantly since the founding of IMPULSE in 2003. The Council on Undergraduate

Research (CUR) maintains an online database of most undergraduate journals, and currently they have over 200 listed; 51 focus specifically on natural or health sciences. However, the majority of undergraduate journals limit their submissions to students at their journal's host university, and reviewing is rarely by undergraduates. These university-specific journals serve as a library database for reviewed research across all disciplines for that particular university. IMPULSE, however, is limited to neuroscience work, but open for submissions from all undergraduates worldwide. An important and unique feature of IMPULSE is that the reviewers are also all undergraduate students. This student-review process is overseen by faculty at Reviewer Training Sites from 14 institutions (open to others), and they provide reviewer and editor training that is centered on an authentic process of submission review. With the increase in undergraduate neuroscience minors, there has been growing interest in integrating the IMPULSE opportunities into the curriculum of those minors, and tailoring its use to meet the research and curricular needs of each school. In addition, IMPULSE's function as both an academic journal and training tool has been shown to benefit students' writing, editing, and leadership skills regardless of discipline. Thus, the model can be extended to other fields to provide the broader experience of reviewing, editing, and publishing articles that goes far beyond merely publishing a student's work.

Disclosures: **R. Sledge:** None. **E. Moore:** None. **H. Johnson:** None. **Z. Kaplan:** None. **S. Snouse:** None. **M. Pavelka:** None. **M. Zrull:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.01SA/NNN9

Topic: J.02. Teaching of Neuroscience

Support: NSF IUSE Grant #1441416

Title: The iNeuro approach to educating scientists to deal with big data is consistent with Vision and Change principles

Authors: *W. E. GRISHAM[1], B. LOM[2];
[1]Dept Psychol, UCLA, Los Angeles, CA; [2]Biol. Dept., Davidson Col., Davidson, NC

Abstract: The iNeuro Workshop was convened to discuss structuring programs that will provide a workforce trained to use big data in neuroscience. This workshop brought together neuroscientists, library/information scientists, computer scientists, bioinformatics scientists, administrators, and educators to discuss this problem. A report of these discussions is available

(https://mdcune.psych.ucla.edu/modules/ineuro). Many of the pedagogical approaches and ideals in the iNeuro report stemmed from principles advanced by *Vision and Change* (V & C; http://visionandchange.org/).
V & C resulted from a 2009 conference convened by NSF and AAAS that attracted biology faculty, college and university administrators, representatives of professional societies, and students and postdoctoral scholars from around the country. V & C discussions focused on 1) What are we going to teach? 2) How are we going to teach it? and 3) How are we going to assess what we have done?
1)What are we going to teach? V & C focused on skill sets including the ability to apply the process of science, using quantitative reasoning, and using modeling and simulation. Further, V & C noted the need for students to communicate and collaborate across disciplines and understand relationships between science and society. Similarly, the iNeuro participants emphasized training in quantitative reasoning, modeling, and simulation to deal with big data in neuroscience. The iNeuro report also emphasized the interdisciplinary nature of big data analytics, understanding ethical and societal considerations, and communicating and collaborating across disciplines.
2) How are we going to teach it? V & C suggested that teaching engage students as active participants; use multiple modes of instruction; ensure that courses are active, outcome oriented, inquiry driven, and relevant; facilitate student learning within cooperative contexts, and introduce research experiences as an integral components. The iNeuro report similarly emphasizes active, multidisciplinary, team-based learning using real data sets and genuine research challenges.
3) V & C suggests that evaluation should integrate multiple forms of assessment to track student learning; give students ongoing, frequent, and multiple forms of feedback on their progress, and view the assessment of course success as similar to scientific research to improve and enhance the learning environment. In the iNeuro report, assessment was visualized as consisting of measures of how well students develop the concepts and skills deemed most important and foundational.

Disclosures: W.E. Grisham: None. **B. Lom:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.02SA/NNN10

Topic: J.02. Teaching of Neuroscience

Support: National Institute of Drug Abuse

National Science Foundation

Helmsley Charitable Trust

Howard Hughes Medical Institute

International Brain Research Organization

Title: The *Drosophila* Neurobiology summer course at Cold Spring Harbor Laboratory: 33 years of teaching on the fly

Authors: *S. LY[1,2], M. F. ZWART[2,3], S. R. PULVER[2,4], C.-H. LEE[2,5], K. R. KAUN[2,6], D. J. STEWART[2];
[1]Ctr. for Sleep and Circadian Neurobio., Univ. of Pennsylvania, Philadelphia, PA; [2]Cold Spring Harbor Lab., Cold Spring Harbor, NY; [3]Janelia Res. Campus, Ashburn, VA; [4]Univ. of St. Andrews, St. Andrews, United Kingdom; [5]NIH, Bethesda, MD; [6]Brown Univ., Providence, RI

Abstract: "*Drosophila* Neurobiology: Genes, Circuits and Behavior" is an immersive three-week course at Cold Spring Harbor Laboratory for students and researchers who plan to use the *Drosophila* model system for investigative neuroscience research. The course provides a comprehensive introduction to *Drosophila* research approaches through both lecture- and laboratory-based training. Daily lectures and seminars are led by experts and leaders in the field who incorporate their own laboratory research into topic-based instruction on *Drosophila* methods and neurobiology. In the laboratory portion of the course, students engage in inquiry-based projects that employ the relevant concepts learned during the course. Guest lecturers also provide experimental assays from their own labs in order to provide students with hands-on experience with up-to-date laboratory techniques. Methods explored in the course include genetically-based molecular analyses, immunocytochemistry, *in vivo* electrophysiology, genetically-encoded live calcium imaging, optogenetic and thermogenetic manipulation of neural activity, as well as numerous quantitative approaches to understanding the neurobiological basis of behavior. Furthermore, students are encouraged to bring their own research questions into the labs in order to better tailor their training for their own research investigations. Notably, a large majority of students from the course have advanced into careers as primary investigators at a wide variety of research institutions across the world. Since 1984, the course provides practical training for neuroscience students while also promotes a culture of continued education and mentorship that has been bolstered by recent efforts to institute an alumni network of past and present instructors and students of the course. The goal of the *Drosophila* neurobiology course at Cold Spring Harbor Laboratory is to provide students with the practical skills and knowledge relevant to studying the neurobiological basis of behavior in *Drosophila* and to conducting rigorous scientific inquiry in the field of neuroscience.

Disclosures: **S. Ly:** None. **M.F. Zwart:** None. **S.R. Pulver:** None. **C. Lee:** None. **K.R. Kaun:** None. **D.J. Stewart:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.03SA/NNN11

Topic: J.02. Teaching of Neuroscience

Title: Evolution of a longitudinal undergraduate medical neuroscience course

Authors: *J. M. MCBRIDE[1], D. NAIR[2], A. ALEXOPOULOS[2];
[1]Educ. Inst., Cleveland Clin. Lerner Col. of Med., Cleveland, OH; [2]Neurol. - Epilepsy, Cleveland Clin., Cleveland, OH

Abstract: Competency based education has long been the primary assessment method in graduate medical education and has recently become a greater focus in undergraduate medical education. This approach directs the learner to build and integrate foundational skills and concepts rather than memorize abstract details. At the Cleveland Clinic Lerner College of Medicine, students are evaluated on their progress in accomplishing 9 different competencies, a process that culminates at the end of the 5 year curriculum. To support this approach to assessment, the first two years of the curriculum are organized in to organ systems based courses, which include each of the traditional subject matters (i.e. anatomy, physiology, pharmacology etc.) presented throughout the course. This approach allows for integration of subject matter content within the larger discussion of a systems based course. With respect to Neuroscience instruction, there have been several faculty lessons learned regarding organization of content presentation, timing of material presented, and level of detail introduced in year 1 versus year 2. The following is a description of a fully integrated, 8 week Neurosciences and Behavioral Sciences course within an organ systems based curriculum. In addition, insight is offered regarding changes made based on course outcome data, outside reviewer suggestions and learner feedback.

Disclosures: J.M. McBride: None. **D. Nair:** None. **A. Alexopoulos:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.04SA/NNN12

Topic: J.02. Teaching of Neuroscience

Support: State of Florida through the Max Planck Scientific Fellows Program

Title: Neuroscience centered post-baccalaureate research experience program at max planck florida institute for neuroscience

Authors: *R. CORLEW[1], J. HERBST[2];
[1]Functional Architecture and Develop. of Cerebral Cortex, Max Planck Florida Inst., Jupiter, FL;
[2]Academic Training Programs, Max Planck Florida Institue for Neurosci., Jupiter, FL

Abstract: Neuroscience is an interdisciplinary endeavor. The introduction of scientists from diverse fields such as electrical engineering, physics, psychology, genetics etc. is part of what makes neuroscience successful. How can we diversify the incoming graduate student pool and expose more students to the questions of neuroscience? We have developed a Post-baccalaureate Research Experience program open to BS graduates in their gap year before applying to graduate school in order to recruit from other fields and train competent and prepared pre-graduate students. The program is built on 3 pillars of training: 1) exposure to full time research 2) communication and 3) professional skills. 1) PRE fellows are selected and placed into labs based on fit with the expectation that a project will develop during the first few months and be presented in abstract and poster form later in the year. Working independently on a project or part of a project, fellows are exposed to the cutting edge science ongoing in their lab and elsewhere in the institute. This is the type of experience that grad programs are looking for in their applicants. 2) PRE fellows are trained in both scientific communication and communicating their science to the public. Fellows take part in the institute's seminars and meetings and specially designed workshops aimed at bridging the skills gap from undergraduate to graduate level science communication. Additionally there is a large public engagement component to the program. PRE fellows are required to communicate science to the public using different platforms. 3) "Soft skills" for a scientist go beyond a firm handshake and good interviewing habits. Successful scientists must now juggle grant writing, IACUC protocols, networking, and other support tasks, on top of doing great science. We've designed special workshops that get Postbacs up to speed with all the support issues that go into doing science. There is an increasing call for education about alternative careers for Postdocs and Graduate students. We've taken this further and designed a lecture series for Postbacs comprised of successful PhDs with alternative careers, so that postbacs can apply to graduate school with an educated understanding of all the different career possibilities and some inspiration for how to maneuver. There are strikingly few postbac research programs open to all candidates. To our knowledge this is the only open program specializing in Neuroscience. The program is only 2 years old and we are already seeing initial success. Supported by the State of Florida through the Max Planck Scientific Fellows Program

Disclosures: R. Corlew: None. **J. Herbst:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.05SA/NNN13

Topic: J.02. Teaching of Neuroscience

Title: A small-group problem-based programmed journal club: considering knowledge on demand in research

Authors: *S. NASOOHI, J. POURAHMAD JAKTAEI, H. YAZDANPANAH, M. FAIZI, S. HOSEINI SHIRAZI, H. VATANPOUR, N. NADERI;
Shahid Beheshti Univ. of Med. Sci., Tehran, Iran, Islamic Republic of

Abstract: Objectives: Problem-based teaching could be applied to journal clubs as the common instruction method in post-graduate education to evoke scholars intellectual interest in research. In this line, considering different stages of thesis project in senior *vs* junior PhD students and the due immediate knowledge requirements may improve their interest as well as confidence to participate in scientific debates. The present two-year survey was conducted to find the impact of problem-based programming in journal clubs which were partitioned according to PhD students' residency year in parallel with thesis progress.
Design: With almost 22 PhD students morning journal clubs met every other week in Neuroscience topics. Students were assigned to group 1 ($\leq 2^{th}$ year) if they not yet submitted thesis proposal, to group 2 ($\leq 4^{th}$ year) if they had but had not made final thesis report or else to group 3. In both presentation and mentorship, every session was segmented coherently into (1) Idea development, (2) Study design and (3) Results interpretations sub-sections in order to engage first to the third group, respectively. That is the presenter's talks for each section was followed by the mentor's oriented implicit questions encouraging the due students to present their view point and reach a consensus. The questions were mainly focused on the rational of each segment, providing alternative practical instances and the possible optimizations.
Evaluation of Method: The new design was evaluated in a paired manner compared to prior sessions in terms of students' active participation and interest. Based on the mean time spent in scientific discussions there was a substantial rise in students' active participation ($p<0.001$) which could be partly ascribed to the increase in number of active participants. Notably, the filled out questionnaire in the end of each semester were indicative of scholars' as they had found it helpful to improve their intellectual capabilities in their projects particularly in synthesizing new research ideas, dissecting and designing specific hypotheses and trouble-shooting. Free polling forms also revealed that the article selection criteria were remarkably improved based on scholars' views; however, was challenging and time taking to the mentors.
Conclusion: Conclusively, while classical lecture-based journal clubs may sound soporific to scholars, acquainting them with the fact that journal clubs may meet their prompt research

requisite could motivate them in active participation. In this context, the encouraging atmosphere of problem-based programmed journal club might facilitate translating the journal clubs' articles to their own research.

Disclosures: **S. Nasoohi:** None. **J. Pourahmad Jaktaei:** None. **H. Yazdanpanah:** None. **M. Faizi:** None. **S. Hoseini Shirazi:** None. **H. Vatanpour:** None. **N. Naderi:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.06SA/NNN14

Topic: J.02. Teaching of Neuroscience

Support: R25 NS089458-01

Title: A new ms program in health disparities in neuroscience-related disorders as a means to increase diversity in the neuroscience workforce.

Authors: *C. MILLIGAN[1], R. A. BELL[2];
[1]Neurobio. and Anat., Wake Forest Sch. Med., Winston Salem, NC; [2]Maya Angelou Ctr. for Hlth. Equity, Wake Forest Sch. of Med., Winston-Salem, NC

Abstract: There are numerous reports that have identified disparities in presentation for care, severity and disability for stroke, Alzheimer's Disease, epilepsy and Parkinson's Disease. Nonetheless, the neurology discipline appears to lag behind other clinical specialties in terms of analyzing the causes, delivery of interventions and treatments across socioeconomic and ethnic groups that result in apparent poor outcomes in disadvantaged populations. In 2010, NINDS convened an external panel to review and provide recommendations to NINDS with respect to the priority, administration and oversight of health disparities research conducted by NINDS. Among the results of the review was the conclusion that there is no specific mechanism for training future health disparity researchers. There are several epidemiology programs throughout the country that focus on neuroepidemiology training, but essentially all programs require trainees to have advanced degrees, most often MDs. The goal of this program is to recruit undergraduate students from diverse backgrounds into a Master's Program in Neuroscience Clinical and Population Studies of Health Disparities at the Wake Forest School of Medicine. There are four unique resources at Wake Forest University that make it an ideal institution for the proposed program: 1) The Maya Angelou Center for Health Equity (MACHE), 2) experience through an established Master of Science in Clinical and Population Translational Sciences, 3) an established Neuroscience Graduate Program and 4) the Division of Public Health Sciences.

Recruitment of students and collaboration with regional undergraduate institutions including HBCUs will be important for attaining our goal. The idea is to interest students a career choice and develop a love of neuroscience and understanding neurological disorders so that a proportion of these MS students will move onto PhD programs. The product of this program will be a solid foundation in neuroscience, epidemiology and biostatistics training and hands-on, practical research projects. This program is supported by R25 NS089458-01.

Disclosures: C. Milligan: None. **R.A. Bell:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.07SA/NNN15

Topic: J.02. Teaching of Neuroscience

Support: CNPQ

SENAD

Title: Attention is associated with success in selection of health students for internship in a drug abuse telehealth service

Authors: *H. M. BARROS, C. L. TANNHAUSER;
UFCSPA, Porto Alegre, Brazil

Abstract: Background: The style of responsabilities and unpredictable work schedules of health care services bring the need of higher attention and concentration of staff. By choosing the correct profile personalle and increasing the level of qualifications, knowledge and abilities, one may expect improvement in the direct and indirect costs of management. Most students of health care carreers need additional training when enrolled in internships. This work is done with undergraduate and graduate students in health care courses, who enlist to start a counselor internship in drug abuse, which occurs in a telehealth service. The selection efficiency relies in finding individuals capable of concentrated attention and multitask performance. This cross-sectional study aims to compare attention and knowledge performance of students selected and not selected to be interns in the telehealth service. Material and Methods: Undergraduate health students from universities in the Porto Alegre area applied to the selection of internship, from June 2009 to May 2014. Drug abuse knowledge test on drugs, clinical case simulation interviews and d2 test were applied in different phases of the process. Results: From 452 candidates, 418 (92%) were selected. Individuals who are selected showed higher scores of concentrated

attention, less mistakes, less fluctuation of attention and higher speed of performance in the d2 test. Secondarily, students of medicine, pharmacy and toxicology courses presented better scores in all dimensions of attention, concentration, speed in performance and precision and students of speech therapy have similar scores in speed of performance but less concentration and precision. Conclusions: In all d2 test sub-categories and in others test the selected candidates scored better than the not selected. There are differences between undergraduate the courses in test scores, which need to be addressed during the internship to develop similar abilities and competencies between all health professionals.

Disclosures: H.M. Barros: None. **C.L. Tannhauser:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.08SA/NNN16

Topic: J.02. Teaching of Neuroscience

Title: Using microcontroller instrumentation to teach cognitive neurophysiology

Authors: *M. JAYACHANDRA[1,2], A. PREMCHANDRA[1], N. HEBBAR[1], M. ARORA[3]; [1]St. John's Res. Inst., Karnataka, India; [2]Bioengineering Group, NDRF, Inst. of Engineers, Bangalore, India; [3]CPDM, Indian Inst. of Sci., Bangalore, India

Abstract: It has been a challenge to teach graduate students experimental neurophysiology in resource-limited situations, given the prohibitive cost of commercial equipment. With the advent of micro-controllers with in-built sensors, e.g., *Arduino*, it is now possible to build robust, cost-effective instrumentation to teach cognitive neurophysiology by demonstrating scalp-recorded auditory event-related potentials (ERPs), e.g., ABR, AEP, MMN, P50-gating, Auditory P300, etc. The vast amount of *Arduino* documentation, tutorials and sample code on the internet allows fast prototyping and deployment on this platform.
We have designed such an *Arduino*-based system where a synchronization trigger generates auditory clicks (0.1ms - 1ms), tones (100ms with 5ms on-off ramps to prevent edge effects), and broad-band white noise of varying lengths. Trigger and stimulus programming was done in the *Arduino* Integrated Development Environment (IDE) using its simple C language variant. Trigger jitter was 5ns and allowed the presentation of short click stimuli (0.1ms). The auditory stimuli were amplified with an off-the-shelf amplifier and the speaker/headphone output was adjusted to ~60dB using a *Brüel & Kjær* Type 2240 sound level meter.
For human recordings, this system was interfaced with bio-amplifiers *(Matsuzaka et al., JUNE, 10(2):A118-A124, 2012)*, and a 2-channel *Tektronix TBS-1000EDU* oscilloscope for A-to-D

conversion and basic analysis. Scalp recordings from C_z and F_z were used to introduce students to electrophysiology and ERP concepts. The inexpensive *EDU* oscilloscope was found well suited for developing teaching courses for electrophysiological data analysis (latencies, peak measurements, area under the curve, FFT, etc.) and *Arduino* programming. Importantly, these courses can be shared on the internet.
This system can be extended to visual cognitive ERPs, e.g, VEP, P300, N400, Recognition Potential, etc., by presenting visual stimuli using a dedicated small-footprint PC and open-source software, e.g., *Raspberry PI* and *OpenSesame.*

Disclosures: M. Jayachandra: None. **A. Premchandra:** None. **N. Hebbar:** None. **M. Arora:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.09SA/NNN17

Topic: J.02. Teaching of Neuroscience

Title: The lab associates program: graduate student training for interdisciplinary work with neuroscientists

Authors: *J. WRIGHT[1], R. FOLEY[2];
[1]Philosophy, Univ. of Western Ontario, London, ON, Canada; [2]Rotman Inst. of Philosophy, London, ON, Canada

Abstract: While interdisciplinary research has obvious benefits, there are significant costs and challenges faced by researchers working at the boundary of multiple disciplines. The demands on young researchers, in particular, can be much higher than in traditional research environments - as they must become experts in more than one discipline. This raises a specific set of challenges for young researchers interested in interdisciplinary projects and for those who are training them. The Lab Associates Program at the University of Western Ontario is designed to address these challenges. The goal of the program is to create a new generation of 'embedded' philosophers who are comfortable working in both philosophical and neuroscientific contexts, and who have experience making philosophical contributions to research in neuroscience.
The Lab Associates Program provides philosophy graduate students at the University of Western Ontario interested in neuroscience with the opportunity to be placed in a neuroscience lab at the Brain and Mind Institute. New trainees are provided with basic instruction on concepts, theories, and methods in neuroscience. They are also provided with exemplars of the program, and of research at the intersection of philosophy and neuroscience. These exemplars demonstrate how

philosophers can engage neuroscientific practice from the perspective of philosophy of mind, philosophy of science, and ethics of neuroscience. Rather than providing training as neuroscientists, the training is focussed on enabling participants to contribute to the research environment of a neuroscience lab as philosophers - bringing to bear a particular skillset in much the same way that other members of the lab environment contribute different skillsets to collaborative research. After the training, trainees are placed in labs of their choosing, where they participate in the activities of the lab with the aim of making a genuine contribution to research. This approach is, to our knowledge, a novel one which has already begun to bear fruit. In this poster we outline the challenges facing this program, and the structures that we have developed to overcome those challenges. We emphasize how a learner-centered approach to training has helped us to ameliorate the extra demands on the trainees that result from participating in interdisciplinary research and to maximize collaborative engagement between the philosophy trainees and members of the neuroscience lab they are in. We also highlight the unique contributions that well prepared philosophy trainees can make to the research life of a neuroscience lab.

Disclosures: **J. Wright:** None. **R. Foley:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.10SA/NNN18

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant 1R25NS076416

Title: BRAINS-Broadening the representation of academic investigators in neuroscience

Authors: ***S. J. MIZUMORI**, M. HORNER-DEVINE, C. MARGHERIO, J. W. YEN; Univ. Washington, Seattle, WA

Abstract: Broadening the Representation of Academic Investigators in NeuroScience (BRAINS) is an NIH-funded, national program designed to diversify neuroscience by increasing career advancement and retention of post-Ph.D., early-career neuroscientists from underrepresented groups. BRAINS explicitly seeks to plug the neuroscience early-career leaky pipeline by offering a professional development program that addresses factors known to affect persistence and career decisions of individuals from underrepresented groups in science, including the following: a weak sense of belonging to the scientific community; isolation and solo status; inequitable access to resources that impact career success; and marginalization from informal networks and

mentoring relationships. BRAINS intentionally targets talented neuroscientists considered at high risk for leaving science and academia due to lack of professional support and career self-efficacy. While we do not yet have data on long-term outcomes, we introduce the BRAINS program Theory of Change and report early quantitative and qualitative data on short-term individual impacts on self-reported career advancing behaviors and experiences. After just five years, the BRAINS program shows strong positive impact on the careers of early-career neuroscientists. For example, 55 of 56 participants remain active in science with elevated research productivity. We describe impacts of the BRAINS program on participants from two cohorts using quantitative and qualitative data from a series of longitudinal surveys. Overall BRAINS participants report significantly increased feelings of career preparedness,confidence in shaping their careers, sense of community and belonging, and career self-efficacy.

Disclosures: **S.J. Mizumori:** None. **M. Horner-Devine:** None. **C. Margherio:** None. **J.W. Yen:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.11SA/NNN19

Topic: J.02. Teaching of Neuroscience

Support: EU FET grant GA: 641100

EPSRC student grant

Title: Brain Studio: A practical high-performance tool to design and simulate spiking neural networks

Authors: ***Z. FOUNTAS**, P. A. M. MEDIANO, D. BHOWMIK;
Imperial Col. London, London, United Kingdom

Abstract: Simulation and exploration of spiking neural networks (SNN) are instrumental to a complete computational neuroscience curriculum, both in an undergraduate or postgraduate level. This poster demonstrates Brain Studio (http://brain-studio.org/), a new cross-platform tool that allows students and academics to design, run and visualize large-scale simulations of brain circuits using spiking neurons. The purpose of Brain Studio is twofold: First, via its core engine and intuitive interface, it can be used for rapid prototyping of any type of SNN, while it maintains high flexibility on the visual representations of the simulation. Thus, a lecturer can stay more focused on teaching concepts, rather than sacrificing valuable time in implementation

details. Its second aim is to provide the first independent graphical environment that can be used with multiple SNN simulators simultaneously. With this approach, the user can integrate different existing models that might have been developed based on different syntax, or design a new model from scratch. For such integration, our system only requires the original models to be either designed in the programming language Python, or in any software system that provides a Python interface. Brain Studio is an open source project that is being developed in the context of the teaching practice at the computational neurodynamics course of Imperial College London as well as the modelling needs of the EU project TIMESTORM - Mind and Time: Investigation of the Temporal Traits of Human-Machine Convergence.

Disclosures: **Z. Fountas:** A. Employment/Salary (full or part-time): Imperial College London. **P.A.M. Mediano:** None. **D. Bhowmik:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

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Program#/Poster#: 24.12SA/NNN20

Topic: J.02. Teaching of Neuroscience

Support: International Group of Neuroscience (Independent, Multi-institutional Support). For ethical, peaceful, non-commercial and responsible applications of Neuroscience (Grant Philosophy: ¨Science for exploration, not for domination").

Title: Left-Right preference and its orthogonal processes in insect navigation: teaching algorithms for recursive programs of general neural principles

Authors: *J. F. GOMEZ-MOLINA[1], U. M. RICOY[2], M. CORREDOR[3], A.-A. RESTREPO-VELAZQUEZ[4], F. LOPERA[1];
[1]Intl. Group of Neurosci. (IGN), Medellin, Colombia; [2]Biology, Chem. and Envrn. Sci., Northern New Mexico Col., Española, NM; [3]Biol. (GEBIOMIC and GRC research groups), Univ. of Antioquia, Medellin, Colombia; [4]Informatica y Sistemas, EAFIT Univ., Medellin, Colombia

Abstract: INTRODUCTION. 1. Animals with bilateral symmetry usually have an anterior part dominated by sensory processing and a posterior part dedicated mostly to (loco)motor functions. There is also a sequential rostrocaudal representation of these processes in the brain. 2. The design of Robots and machines has received inspiration from the general properties of this architecture. 3. The left-right preferences (e.g. handedness) of the fire ant Solenopsis Invicta has been studied for the jaws and legs (Cassill 2007, 2009). 4. We have proposed that there are Anterior-Posterior Processes (APP) that organize the left-right electrophysiological signaling of

the brain (in humans, by multiplexing, Gomez 1986, BS-Thesis; Gomez and Lopera 1997 DOI: 10.1109/ICNN.1997.611697) as well as the turning behavior and spatial preferences during locomotion (in ants, Gomez, 2007, PhD-thesis, UTSA; Gomez and Renthal, SfN-abstract 2007). 5. A bilateral architecture defines a coordinate system and left/right spaces outside of the body where asymmetries can be projected. 6. Asymmetry of antennal grooming in cockroach has been reported (Zhukovskaya 2016). In this work we continue to explore theoretically and computationally how Left-Right Processes (LRP) are coordinated with APP at different levels. METHODS. Mathematical and computational tools. Video-recordings in ants and cockroaches during spontaneous behaviors (locomotion, turning, grooming) in the field and in the laboratory. CONCLUSIONS. 1. Differences in phase and intensity of LRP can cause asymmetry in behavioral activity at the individual and at the ecological level (i.e. invasion, propagation and distribution patterns of colonies and insects). 2. In neural models of insect turning and navigation, angular and linear information present a trade-off (*) that can be spatially coded by LRP and APP. 3. Analyzing locomotion in insects is a powerful method to introduce complex analog processes in the classroom like random walks, directed walks (idiothetic and allothetic) and levy walks 4. Subroutines of random walks and APP vs. LFP coordination can be recurrently called at different levels, from molecular to ecological levels (e.g. see Gomez-Molina, Corredor, Restrepo, Ricoy 2015 Computer Simulation for ions under electric and magnetic fields. III Colombian Congress on Computational Biology and Bioinformatics, Medellin Colombia 2015 DOI: 10.13140/RG.2.1.4097.4805 https://www.researchgate.net/profile/Juan_Gomez-Molina/contributions) 5. This work is intended to involve universities at TX (UTSA), FL (USF), NM (NNMC), CA(UC) and Colombia (UdeA).

Disclosures: J.F. Gomez-Molina: None. **U.M. Ricoy:** None. **M. Corredor:** None. **A. Restrepo-Velazquez:** None. **F. Lopera:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.13SA/NNN21

Topic: J.02. Teaching of Neuroscience

Title: Active learning of clinical neuroscience in a medium sized group setting

Authors: *A. WEERASURIYA;
Mercer Univ. Sch. Med., Macon, GA

Abstract: Lectures to a large group (<60) of students on a pre-selected topic is conducive for passive learning. But it is generally recognized that active learning is a better paradigm for

teaching complex problem-based material. Unfortunately, active learning cannot be conducted in a large class room. Active learning is best conducted in a small group setting of about 5 to 8 students and one facilitator/tutor. One of the questions that arise thereof is whether there are any conditions under which active learning can be conducted in medium-sized groups of less than 30 students. Using a few scenarios of clinical neuroscience, I have developed a paradigm of active learning for teaching spinal cord anatomy and clinical correlates to first year medical students. The clinical scenarios used are:- diabetic neuropathy, tabes dorsalis, syringomyelia (intra-axial lesion), bone spur at cervical level (extra-axial lesion), infarction in the anterior spinal artery and falcine meningioma. For each scenario I begin by offering a single presenting symptom. Based on that the students ask me a question about the presence/absence of another symptom or the result of a test. My answer to that question helps the students to narrow the putative site of the focal lesion. This helps them to eliminate a few possibilities and ask another question hoping my answer will enable them to further limit the list of possibilities. With about 3 or 4 such questions and answers, the students are able to name the clinical entity and locate the offending focal lesion. The clinical entity which is most difficult for them is the falcine meningioma. These sessions last about 90 minutes with a 30 minute preamble on basic spinal cord anatomy and clinical correlates. I will present flowcharts of how students reason their way to diagnoses of the above clinical entities. I will also highlight the potential pitfalls where a little guidance helps the students to avoid reasoning *culs-de-sacs*. I have found that a very small group (5-8) is not very productive because it does not reach a critical mass. Perhaps the ideal size for these sessions is about 20 students. In larger groups, there is a tendency for the weaker students to be non-participatory observers. Unfortunately a few students prefer not to attend these sessions. The explanation they offer is that they are intimidated by the presence of ‘smarter’ students who participate more actively. The most difficult task for the facilitator is to encourage the active participation of these ’quieter’ students and at the same time limit the number of questions from the more active students without dampening their enthusiasm. This paradigm can be extended to teach other areas of clinical neuroscience.

Disclosures: A. Weerasuriya: None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.14SA/NNN22

Topic: J.02. Teaching of Neuroscience

Support: NIH/Harvard Catalyst UL1 RR025758

Title: Standardized method for training and assessing competency in the application of transcranial magnetic stimulation

Authors: *P. J. FRIED, P. DAVILA PEREZ, A. JANNATI, A. PASCUAL-LEONE; Neurol., Beth Israel Deaconess Med. Ctr., Boston, MA

Abstract: Background. Transcranial magnetic stimulation (TMS) has been used as a clinical treatment and in clinical and basic research for more than 30 years. Once found only in a few specialized research labs and clinics, TMS is now conducted in hundreds of labs across the United States and throughout the world. Despite its expansion, there is no standardized method of training and assessing competency of TMS technicians and researchers. As such, it is up to each institution, lab, or principal investigator to ensure that the individuals responsible for administering TMS have the proper training to safely and consistently apply TMS. The Berenson-Allen Center for Noninvasive Brain Stimulation at Beth Israel Deaconess Medical Center has been at the forefront of TMS education – offering Continuing Medical Education-accredited courses in TMS for nearly 10 years. More recently we have led intensive hands-on workshops to train clinical researchers to perform TMS in multisite clinical trials. We developed a quality assurance/quality control (QA/QC) program to assess and reassess core competency in TMS for our in-house technicians and have begun to offer these services to other institutions/investigators through our Core for Noninvasive Brain Stimulation.
Approach. 8 technicians performed QA/QC procedures over 2 visits on a single healthy individual, who provided written consent. The Institutional Review Board at Beth Israel Deaconess Medical Center oversaw all procedures. The subject was seated comfortably throughout the QA/QC session. TMS was applied in single biphasic pulses using a figure-8 coil attached to a MagPro stimulator. Motor evoked potentials (MEPs) were recorded from the right first dorsal interosseus muscle by surface electromyography. The neuronavigation system Brainsight™ was used to record the location of TMS pulses on the subject's MRI, but was not visible to the technicians. Each technician located the motor hotspot, assessed the resting motor threshold (RMT), and applied 30 single pulses at 120% of RMT. Technician performance was assessed in terms of the location of the motor hotspot, the resting motor threshold, the spread of the 30 pulses (mean distance from the hotspot they selected), and the average MEP amplitude.
Conclusion. Our QA/QC program focuses on the most crucial components common to nearly all TMS applications: (1) finding the motor hotspot, (2) assessing the motor threshold, and (3) maintaining consistent coil location throughout stimulation in the absence of MRI-guided neuronavigation. We believe this program fills the need for a standardized repeatable metric for assessing core competency in the safe and consistent application of TMS.

Disclosures: P.J. Fried: None. **P. Davila Perez:** None. **A. Jannati:** None. **A. Pascual-Leone:** F. Consulting Fees (e.g., advisory boards); Nexstim, Neuronix, Starlab Neuroscience, Neuroelectrics, Axilum Robotics, Magstim, Neurosync.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.15SA/NNN23

Topic: J.02. Teaching of Neuroscience

Title: Tutorial contents on neuroinfomrmatics platforms

Authors: *Y. YAMAGUCHI[1], S. HATTORI[2], K. TAKAO[3,4], Y. OKUMURA[1], S. SUENAGA[1], I. ISHII[1], A. HONDA[1], M. OGAWA[1], S. USUI[1], T. MIYAKAWA[2,4]; [1]Neuroinformatics Japan Center, RIKEN BSI, Wako, Japan; [2]Inst. for Comprehensive Med. Sci., Fujita Hlth. Univ., Toyoake, Japan; [3]Life science research center, Univ. of Toyama, Toyama, Japan; [4]Ctr. for Genet. Analysis of Behavior, Natl. Inst. for Physiological Sci., Okazaki, Japan

Abstract: INCF (International Neuroinformatics Coordinating Facility) Japan Node manages web-databases for public use. The database covers vision science, neuroimaging, comparative neuroscience of invertebrates and vertebrates, computational neuroscience, anatomy and gene expressions, etc. (http://www.neuroinf.jp/) All databases are devoted to users for their instantaneous use either by downloading or by on-line preview. We also developed the neuroinformatics infrastructure for knowledge integration across databases. Usage of these resources for the sake of teaching in neuroscience is our important objective.
Among our databases, “Mouse Phenotype Database” (http://www.mouse-phenotype.org/) has been recently developed and ready for public use. It consists of raw data collected from comprehensive behavioral tests in genetically engineered mice. So far, we obtained raw data from more than 180 strains of mice with reasonably standardized methods. Our database also provides programs used in the behavioral analyses. The utilization of our database may contribute to progress in understanding gene-brain-behavior relationship.

Disclosures: Y. Yamaguchi: None. **S. Hattori:** None. **K. Takao:** None. **Y. Okumura:** None. **S. Suenaga:** None. **I. Ishii:** None. **A. Honda:** None. **M. Ogawa:** None. **S. Usui:** None. **T. Miyakawa:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.16SA/NNN24

Topic: J.02. Teaching of Neuroscience

Title: Mindfulness based practice in a medical school classroom: Nonjudgmental embodied attention to self body systems is used as part of the curriculum.

Authors: *S. A. RUDE;
Dept Basic Sci., Bastyr Univ., Kenmore, WA

Abstract: Mindfulness based exercises were practiced in the context of courses exploring the anatomy and physiology of different body systems. These exercises were embodied study guides for information dense material covering neural and other body systems and structures as a way to facilitate deep learning. Courses were either in the first year medical school curriculum or in undergraduate premed or professional degree programs. In each case, for periods ranging from ten to thirty minutes depending on the course, students were invited to attend to sensations in their own bodies, usually as a beginning exercise in class. Guiding questions were used to direct attention with intentionally objective awareness to the particular body system or structures being studied that day. Students were encouraged to notice thoughts and emotions that would arise as a consequence of that attention, whether directly related to that system or not. In an attempt to control prejudicial mindsets and normalize buy-in, these activities were initially not identified as mindfulness meditation, and instead were presented as attention focusing exercises that would enhance executive function and memory recall as part of active learning. Students were provided with guidelines with respect to attitude and intention, including upright and relaxed posture (described as reducing thoracic compression and facilitating relaxed breathing), quiescence (to concentrate on sensation), and objectivity (to acknowledge to the best of their ability all sensations and thoughts as they arose without conscious filtering or judging). These guidelines were presented as being in the context of naturally occurring competitive or synergistic neural function, and were to be recognized consciously in the form of gratitude for the ability to notice and to explore one's own neural function. A fundamental emphasis was placed on kindness toward one's self and others even in the face of negative judgments that might occur. Through anonymous surveys distributed at the end of midterm and final exams, students responded via Likert-like rating scale statements describing their out-of-class and in-class stress levels impacting their engagement with course material. Other statements addressed their sense of control over their learning and their desire for further inquiry and practice in mindfulness. Additional unprompted free response comments expressed positive outcomes to mindfulness practices that included increased attention, decreased stress, and positive generalizations to other academic and nonacademic environments.

Disclosures: S.A. Rude: None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.17SA/NNN25

Topic: J.02. Teaching of Neuroscience

Title: Hands-on neuroscience education for pre- and post-doctoral students using mouse models

Authors: *M. SASNER[1], K. LARUE[1], D.-T. LIN[2], C. WRAY[1];
[1]The Jackson Lab., Bar Harbor, ME; [2]NIDA, Bethesda, MD

Abstract: The Jackson Laboratory (JAX) has been offering high quality courses for advanced students in the field of mouse genetics for almost 60 years. Each year we seek to enhance our offerings with innovative courses in emerging fields. In June 2016, we hosted a new 3.5 day intensive course for graduate students and postdocs titled *Workshop on Neurogenetic Tools: Using Mouse Models to Study Human Disease* at our facility in Bar Harbor, Maine. During the course, participants were able to discuss a diversity of genetic methods and tools employed in the study of neuron and circuit function such as optogenetics, systems genetics and image analysis. Topics addressing the modeling of neurological disease in the mouse models included CRISPR and cre technology and high-throughput behavioral testing modalities. Attendees were able to get hands-on experience with laboratory techniques including tissue clearing and visualization of genetically expressed markers, use of viral vectors, navigating bioinformatic tools and databases. Additionally, they were able to interact with leaders in the field of neurobiology and with each other to develop research collaborations. The course will evolve annually to incorporate new technologies and post-course participant feedback. Success of the instruction will be evaluated by this feedback and a six month follow up assessment of collaborations formed and knowledge and skills utilized in the participant's research. With course offerings such as this, we aim to satisfy the JAX mission: to empower the global biomedical community in our shared quest to improve human health.

Disclosures: **M. Sasner:** None. **K. LaRue:** None. **D. Lin:** None. **C. Wray:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.18SA/NNN26

Topic: J.02. Teaching of Neuroscience

Title: Consumption of fluoridated water leads to damage on the hippocampal ca1 field in the rat

Authors: *P.-V. MARIA ISABEL[1], A. CASTELLANOS ALVARADO[2], M. MIRANDA BELTRAN[2], L. VALDEZ JIMENEZ[2], O. GUTIERREZ CORONADO[2], C. SORIA FREGOZO[2]; [1]Univ. De Guadalajara, Lagos De Moreno, Mexico; [2]Univ. de Guadalajara, Guadalajara, Mexico

Abstract: Fluorine (F) is a toxic reactive element and exposure to it passes almost unnoticed with the consumption of tea, fish, meat, fruits, etc. and articles in common use such as: toothpaste additives; dental gels, non-stick pans and razor blades as Teflon. It has also been used with the intention of reducing dental caries. Fluoride can accumulate in the body, and it has been shown that continuous exposure to it causes damaging effects on body tissues, particularly the nervous system directly without any previous physical malformations. Several clinical and experimental studies have reported that F induces changes in cerebral morphology and biochemistry that affect the neurological development of individuals as well as cognitive processes, such as learning and memory. The hippocampus is widely accepted to play a pivotal role in memory navigation in large scale space. F can be toxic by ingesting one part per million (ppm), and the effects are not immediate, as they can take 20 years or more to become evident. The effect of fluoridated water consumption on neuronal density and morphology of the hippocampal CA1 field in the rat was evaluated. Three groups were formed: control (T), Experimental I (EI) and Experimental II (EII). T and EII groups ingested jug water during pregnancy and lactation of pups until weaning (day 21 of postnatal age), the control group consumed jug water to 130 days, while the pups EII ingested fluoridated water to 4 ppm, from weaning to 130 days. The group was exposed to fluoridated water consumption to 4 ppm during the period of pregnancy, lactation and up to 130 day old rat when behavioral assessment was performed using the Morris maze, after which the rats were sacrificed, the brain was removed and hippocampal CA1 area was dissected. In the case of animals which was applied fluoride in their drinking water, the increased levels of fluoride was detected in the plasma, in addition, alterations on neuronal density and morphology the hippocampal CA1 field in the rat were observed The sodium fluoride ingestion at 4 ppm in drinking water alter the histological feature of the hippocampal CA1 area. The prolonged ingestion of F may cause significant damage to health and particularly to the nervous system. The exposure to F can disrupt the synthesis of neurotransmitters and receptors such as acetylcholine, and furthermore, the exposure to F also produces neural dysplasia and other damage on the synthesis of proteins in the brain, leading to degenerative changes in neurons.

Disclosures: **P. Maria Isabel:** A. Employment/Salary (full or part-time): 2Castellanos-Alvarado A. B. Contracted Research/Research Grant (principal investigator for a drug study, collaborator or consultant and pending and current grants). If you are a PI for a drug study, report that research relationship even if those funds come to an institution; 1Pérez-Vega MI,. C. Other Research Support (receipt of drugs, supplies, equipment or other in-kind support); 1Miranda-Beltran ML. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); 1 Valdez-Jiménez L. F. Consulting Fees (e.g., advisory boards); 1Soria-Fregozo C. Other; 1Gutierrez-Coronado O. **A. Castellanos Alvarado:** None. **M. Miranda Beltran:** None. **L. Valdez Jimenez:** None. **O. Gutierrez Coronado:** None. **C. Soria Fregozo:** None.

Theme J Poster

024. Graduate and Professional Teaching

Location: Halls B-H

Time: Saturday, November 12, 2016, 1:00 PM - 5:00 PM

Program#/Poster#: 24.19SA/NNN27

Topic: J.02. Teaching of Neuroscience

Title: Integrating rigor and reproducibility into the graduate neuroscience curriculum

Authors: *E. E. SERRANO;
Biol., New Mexico State Univ., Las Cruces, NM

Abstract: Training in experimental design has emerged as a core theme in the education of young (neuro)scientists. This presentation disseminates a strategy for introducing graduate students to the elements of rigor and reproducibility in a seminar setting at a minority (Hispanic) serving institution. The curriculum was organized for a 1 credit graduate Neurogenetics seminar that comprised students with varying background in neuroscience who are pursuing MS or PhD degrees in multiple majors (e.g. molecular biology, psychology, cell biology, animal science, counseling psychology). Activities were designed to prepare students to meet emerging rigor and reproducibility standards through guided critique of experimental design in the primary literature. The learning paradigm leveraged free resources such as NIH training materials in rigor and reproducibility, open source publications, and the 'Hypothes.is' software for web annotation. The reading material emphasized contemporary themes including epigenetics, genome wide association studies, and precision medicine. Students worked collaboratively on web annotation discussions, on construction of rubrics for evaluation of experimental design, and on identification of the elements of a rigorous scientific argument. Through individual capstone written and oral projects, students applied concepts to analyze a subset of the literature for evidence of a genetic basis for a neural disease. The ethical implications or concerns raised by the experimental design or other aspects of the publication were a component of the summative critique. While the breadth of disciplinary backgrounds posed a challenge with regard to establishing a common foundation for the class, the disciplinary differences enabled students to combine their collective knowledge for deep analysis of the scientific literature and strengthened their ability to communicate to wider audiences.

Disclosures: E.E. Serrano: None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.01SU/NNN28

Topic: J.03. Public Awareness of Neuroscience

Support: SfN Chapter Grant

Dana Alliance for Brain Initiatives

Moravian College Community Grant

Title: 2016 Brain awareness season in the Lehigh Valley: Enhancing service learning and scientific advocacy

Authors: *L. KANAKAMEDALA, C. FOX;
Moravian Col., Bethlehem, PA

Abstract: For the past seven years, Moravian College's Brain Club has worked closely with the Lehigh Valley SfN Chapter to create brain awareness programs that are both diverse and exciting to people of all ages. The goal of the program has been to not only educate the public of the functions of the nervous system and advances in neuroscience research, but also promote scientific advocacy within the community. Each service learning project we have designed has sparked the interest of younger children within the sciences. Through our "Norbit the Neuron" story time event to our festive "Brain Party event, we have engaged children and their families in a broad range of activities, including EEG exercises, brain dissections, optical illusion and sensory testing. These activities have given us the opportunity to open the minds of younger children to a new field of science they may have never considered before. We have also expanded our programs to target individuals of an older age. By developing education programs for our senior communities, we have bridged the lines of communication with this vibrant age group. As a liberal arts institution, Moravian College has incorporated an interdisciplinary approach in the discussion of Neuroscience. Annually, we offer a Brain Awareness Week seminar and film series with a different topic such as The Musical Brain, The Art of Neuroscience, and Poverty and Inequality. We have noticed that our programming has become both rewarding for the general public and the students at Moravian College. Through our programming, we have offered neuroscience students the opportunity to share their knowledge of the nervous system and benefits of brain research with the general public. Each student has found the experience to be worthwhile. Not only did they have the chance to expand and improve their own knowledge, but also take on the position as role models for younger students. Through each event, students have increased their personal development in areas such as personal identity, social responsibility, leadership and communication. Through these skills we have been actively encouraging our campus community to become more involved in scientific advocacy. With our petition signing events and representative visits, we hope to gain the support of local government officials in creating lasting changes within the scientific community. Each year we see our

support rise and hope to expand our program in opening the minds of others to the need of scientific funding. We find it both rewarding and important to target individuals of all ages and through new activities and programs, we will continue to expand our endeavors in showing our community what Brain Awareness is all about!

Disclosures: **L. Kanakamedala:** None. **C. Fox:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.02SU/NNN29

Topic: J.03. Public Awareness of Neuroscience

Support: California State University

Title: A regional model for concussion education and outreach

Authors: ***E. LARSON**[1,2], M. ORTIZ[2], A. MENDONCA[2], J. ORTEGA[2];
[1]North Coast Concussion Program, [2]Humboldt State Univ., Arcata, CA

Abstract: Despite widespread publicity of concussion risk among professional athletes there is still a need for education on concussion risk and management among school-aged athletes and the general population. The authors established the North Coast Concussion Program (NCCP) in 2008 to provide low cost or free concussion education and treatment to a community of approximately 100,000 people in Northern California. The NCCP, in conjunction with the California State University system, also developed an online concussion education training program for athletic coaches which will have state-wide reach. The NCCP provides education and outreach through partnerships with local doctors, hospitals, sports organizations, and schools, with the option of continuing education units for clinicians. Services include pre-concussion baseline cognitive testing for athletes and post-concussion cognitive assessments and individualized recovery plans for all members. These services are guided by concussion research and conform to consensus best practices in the field. The organizational structure of the NCCP is flexible and can be replicated in diverse communities to provide effective, economically sustainable concussion education and management to at-risk athletes and the general community.

Disclosures: **E. Larson:** A. Employment/Salary (full or part-time): North Coast Concussion Program/part-time. **M. Ortiz:** None. **A. Mendonca:** None. **J. Ortega:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

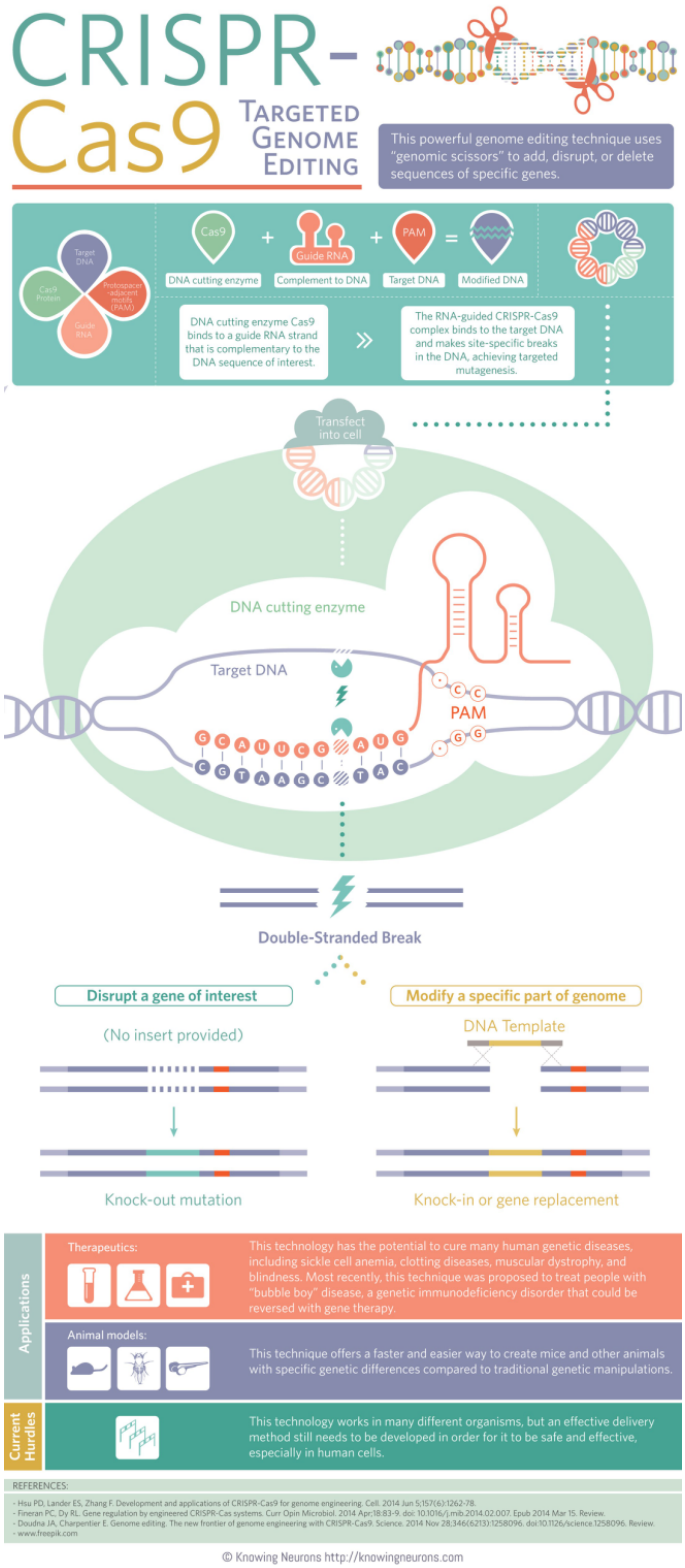
Program#/Poster#: 25.03SU/DP10 (Dynamic Poster)

Topic: J.03. Public Awareness of Neuroscience

Title: Knowing Neurons: A creative neuroscience education website by young neuroscientists

Authors: *K. E. FEHLHABER[1], J. FROHLICH[1], J. TRIBBLE[1], A. RAMANATHAN[2], J. LEE[2];
[1]UCLA, Los Angeles, CA; [2]USC, Los Angeles, CA

Abstract: Today's students use the Internet to clarify complicated topics and explore newsworthy developments. Unfortunately, brain research is often misrepresented in the popular press, and there are few online resources to explain fundamental neuroscience concepts. Knowing Neurons is a neuroscience education website that encourages anyone to learn about the brain in a creative, curiosity-driven format. Articles at Knowing Neurons feature recent neuroscience discoveries and technological advances, as well as summaries of basic neuroscience ideas in ways that are easy to understand and aided by powerful visuals. Scientists have a responsibility to communicate their work to the general public in a way that is accurate without being dry, uncomplicated without oversimplification, and exciting without exaggeration. Few graduate programs offer their students any opportunities to practice science communication, a skill that is becoming increasingly important as social media more directly connects scientists to the public. Knowing Neurons aims to give young (graduate student and postdoctoral scholar) neuroscientists the opportunity to hone their communication skills by educating people about the brain, the role of biomedical research in advancing medical knowledge, and the importance of fundamental research in revealing the inner workings of the mind. Knowing Neurons is run by a group of young neuroscientists who are passionate about creating quality educational content. Using diverse formats, ranging from blog-style posts and poster-size infographics to podcast-style interviews and animated YouTube videos, contributors have the creative freedom to explore novel modes of scientific communication that casual learners and professional educators can use at home or in the classroom alike.



Disclosures: **K.E. Fehlhaber:** None. **J. Frohlich:** None. **J. Tribble:** None. **A. Ramanathan:** None. **J. Lee:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.04SU/NNN30

Topic: J.03. Public Awareness of Neuroscience

Support: NIH Grant EY017271

Title: Interactive neuroscience workshops for high school students

Authors: *S. B. KHANNA[1,2,3];
[1]Dept. of Ophthalmology, [2]Dept. of Bioengineering, [3]Ctr. for Neural Basis of Cognition, Univ. of Pittsburgh, Pittsburgh, PA

Abstract: The University of Pittsburgh's Swanson School of Engineering INVESTING NOW program is a college preparatory program designed to stimulate and encourage pre-college students from underrepresented minorities to pursue majors and careers in science, technology, engineering, and mathematics (STEM) fields. During the summer, 9th-11th grade students attend classes on the University of Pittsburgh's campus in the morning, and then participate in hands-on workshops in the afternoon. These workshops range in subject matter from cellular and tissue engineering to biomechanics to neuroscience. As part of the neuroscience workshop curriculum, students first learned to model the visual system through creating a light sensitive electrical circuit using common elements such as resistors and photodiodes. In the second workshop, students wrote computer programs to decode intended arm movements from simulated neural activity. Finally, students learned how electrical activity can influence behavior through the Backyard Brains (Ann Arbor, MI) RoboRoach Kit. Each workshop began with a brief introduction to the neuroscience themes that would be addressed that day followed by a short description of the instructions for the workshop. At the end of all three workshops a quiz was given based on the material covered in the introduction and the activities. By participating in these workshops, students were able to directly apply knowledge they had learned from classes in an interesting and exciting way, as well as be exposed to some of the research areas within neuroscience.

Disclosures: S.B. Khanna: None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.05SU/NNN31

Topic: J.03. Public Awareness of Neuroscience

Support: Oregon Community Foundation Weston Fund

M.L. Edwards Foundation

FEI

Miller Foundation

NIH Grant AA10760

VA Grant #101BX000313

Title: Nonprofit partnerships for neuroscience education

Authors: J. S. JANOWSKY[1], S. SHUGERMAN[2], *J. C. CRABBE[4,3];
[1]Saturday Acad., Portland, OR; [2]Office of Sci. Educ. Opportunities, [3]Behavioral Neurosci., Oregon Hlth. & Sci. Univ., Portland, OR; [4]Portland Alcohol Res. Ctr., VA Portland Hlth. Care Syst., Portland, OR

Abstract: We describe a unique and low cost sustainable model for education that can be replicated elsewhere. Saturday Academy, an education nonprofit, Oregon Health & Science University (OHSU) and the co-located Veterans Affairs Medical Center (VA) have partnered to promote neuroscience and more generally STEM education for over 30 years. This partnership is one of many that Saturday Academy utilizes to provide 550 classes and camps, over 100 afterschool classes and over 150 high school internships to serve over 7000 students annually. The model has three features that guide all programming:
• Students are curious and highly capable if we give them opportunities to show it.
• Adult experts provide depth of knowledge, passion and are career models.
• All programming is in-depth and hands-on.
These organizations have partnered on two Saturday Academy delivery models: Open-enrollment classes and camps (all day workshops to full week summer day camps) for students in grades 2-12, and an 8 week, full time summer high school internship program, Apprenticeships in Science and Engineering. Internship students do a research project and have additional learning opportunities. OHSU faculty, postdoctoral fellows, graduate and medical students are community experts who advise Saturday Academy, teach or mentor students. There are no set curricula. Instead, Saturday Academy advises instructor/mentors on program activities, provides professional development on classroom management, hands-on teaching methods, and connects community experts to master instructors. Thus, OHSU and VA experts teach their passion and expertise. This means that the programs and knowledge remains dynamic year to year based on changes in science and the expertise of those who volunteer. Saturday Academy

provides registered students, marketing of the program to the community, advice, supplies and technology, stipends for the high school interns and for non-volunteer instructors. This partnership funds programs through grants, contracts and earned income. In 2015, 230 students took biomedical classes, camps and internships and over 70 faculty and staff participated in one or more program. The opportunity for career exploration through these programs has resulted in students returning to OHSU and the VA as neuroscience graduate students as well as expanded the teaching portfolio of OHSU/VA staff and students. We welcome inquiries to replicate this model elsewhere.

Disclosures: **J.S. Janowsky:** None. **S. Shugerman:** None. **J.C. Crabbe:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.06SU/NNN32

Topic: J.03. Public Awareness of Neuroscience

Title: The 2016 United States regional brain bee championship

Authors: N. MYSLINSKI, *J. D. GREENSPAN;
Dept Neural and Pain Sci., Univ. Maryland Dent. Sch., Baltimore, MD

Abstract: After three days of intense competition, the 2016 USA Regional Brain Bee Champion is **Karina Bao.** The Brain Bee is a neuroscience competition for teenage students. A record 56 Chapter winners from 35 states competed at the **University of Maryland, Baltimore on March 18-20, 2016**. Karina is a junior at **Little Rock Central High School** and represented the Central Arkansas Brain Bee Chapter. She won a scholarship, a summer internship at a neuroscience lab, and the right to represent the USA at the eighteenth **International Brain Bee (IBB) Championship in Copenhagen, Denmark** where she will compete against the regional champions from approximately 27 countries, such as **Australia, Brazil, Canada, China, Germany, India, Iran, Israel, Italy, Japan, Korea, Malaysia, New Zealand, Nigeria, Poland, Romania, Singapore, South Africa, Ukraine, United Arab Emirates and others.** The 2016 IBB Championship is hosted by the **Federation of European Neuroscience Societies** (See IBB Poster). The Brain Bee tests a student's knowledge of the human brain, including such topics as intelligence, emotions, memory, vision, Alzheimer's disease, Parkinson's disease, among others. The USA Championship competition involves a neuroanatomy laboratory exam with human brains, patient diagnosis involving face-to-face interactions with patient actors, brain histology, and a final Q&A round. To advance to the USA Regional Championship, Karina had to win one of the Brain Bee competitions conducted by the 100 plus Brain Bee Chapters in the USA. The

Central Arkansas competition is coordinated by **Dr. Andrew James** and held at the **Little Rock Main Library**. Second place went to **Xuchen Wei** representing the **Indianapolis, Indiana** Chapter coordinated by **Bethany Neal-Beliveau**, and third place went to **William Ellsworth** representing the **Atlanta, Georgia** Chapter coordinated by **Reagan Koski**. Other cities with students in the top ten are **Birmingham; Chicago; Saint Louis; Kansas City; Los Angeles; Hershey, Pennsylvania; and Biddeford, Maine.** The USA Regional Brain Bee was founded by **Dr. Norbert Myslinski, Department of Neural and Pain Sciences, University of Maryland Dental School**, and is one of more than 50 World-Wide Brain Bee Regions. It utilizes **Limbic Learning** to motivate young men and women to learn about the brain, and inspire them to consider careers in the basic and clinical neurosciences. **Limbic Learning** refers to emotion-enhanced learning, relying on engagement of emotion networks, of the brain, especially the amygdala. Dr. Myslinski says, "We need future clinicians and researchers to treat and find cures for neurological and psychological disorders. The Brain Bee builds better brains to fight brain disorders."

Disclosures: N. Myslinski: None. **J.D. Greenspan:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.07SU/NNN33

Topic: J.03. Public Awareness of Neuroscience

Support: No grants proper. In the interest of disclosure, public awareness may translate to new members or workshop atendance. Backyard Brains has on occasion provided small stipends to presenters &/or The Lab.

Title: Do it yourself biology in Los Angeles

Authors: *D. FOSTER;
C/O The LAB, Los Angeles, CA

Abstract: The general public is often curious about biotechnology and neuroscience research, but has often been left to read about these activities in the popular press rather than participate hands-on. For those not in academia or industry, gaining access to laboratory facilities can be a challenge. Here we describe our DIY neuroscience workshops conducted at "The Lab", a user funded community biology lab in downtown Los Angeles. Over the past 3 years The Lab has given seven workshops providing instruction on the fabrication of Backyard Brains' bioamplifiers. Participant vocations have ranged from middle school student to university

professor. The amps themselves have been put to use in music projects, science fair studies, and Do It Yourself (DIY) bio. The response of our workshops have been overwhelmingly positive, with one of our alumni becoming a 2015 Broadcom Masters Science Fair finalists. The growth of the DIY biology community supports the notion that many people harbor an interest in biology long after they leave school. Our experience is consistent with that idea.

Disclosures: D. Foster: None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.08SU/NNN34

Topic: J.03. Public Awareness of Neuroscience

Support: NIH R01 NS39600 (BISTI)

NIH R01 NS086082 (CRCNS)

NSF BRAIN DBI 1546335 (EAGER)

Title: A decade of NeuroMorpho.Org: lessons learned and future prospects

Authors: *R. ARMANANZAS, S. POLAVARAM, S. NANDA, P. MARAVER, G. A. ASCOLI;
Krasnow Inst. For Advanced Study, George Mason Univ., Fairfax, VA

Abstract: NeuroMorpho.Org is the largest centrally curated online repository of digital reconstructions of axonal and dendritic morphologies. This public resource freely provides light and electron microscopy tracings contributed by more than 200 labs worldwide from over 450 publications. Since the 2006 release of 1029 neurons in version 1.0, data content has steadily grown to 37,712 in v.6.3 (March 2016) spanning 35 species, 41 brain regions, and 150 cell types. After 10 years, NeuroMorpho.Org tallied 5+ million downloads from 153 countries around the globe.
A decade ago, however, neuroscience data sharing was an even rarer unicorn than it is today. The few labs active in time-consuming reconstructions tended to keep the data private until pioneers in selected sub-fields (notably spinal cord and hippocampus) demonstrated the potential communal benefit by openly releasing their tracings. To promote this culture, NeuroMorpho.Org explicitly credits the original authors for all data and requests citations to the primary literature upon re-usage. Although all reconstructions in the repository are associated with peer-reviewed publications, thorough in-house data curation ensures file standardization and an added layer of

quality control. Transparency is preserved by posting both original and processed tracings as well as the change logs and any post-release data or metadata updates. Users can freely download all content in non-proprietary format with no signup requirement.
Many international efforts are now producing large numbers of 3D neural tracings. Glia arbors are also beginning to be digitally acquired. Moreover, 4D and 5D reconstructions will soon be available from time-lapse and multi-channel light microscopy. Upon passing 50,000 neuronal reconstructions in the v7.0 release, we project yearly increments exceeding 10,000 cells going forward. Hence, to maintain dense coverage of available data, it is essential that informatics infrastructures keep up with bioengineering innovation. Collaborations are continuing through knowledge networks via platform cross-links, data integration, and web services using a new application programming interface.
Steady NIH and NSF funding was undoubtedly key to the success of NeuroMorpho.Org. As return on investment, nearly 500 academic publications so far utilized content downloaded from the repository. We foresee a continuous expansion of data sharing in the years to come, followed by multiplicative increase in secondary discoveries. Because of the data mining potential to reveal patterns from pooled datasets that are not discernible from single-lab experiments, "the whole is greater than the sum of its parts".

Disclosures: **R. Armananzas:** None. **S. Polavaram:** None. **S. Nanda:** None. **P. Maraver:** None. **G.A. Ascoli:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.09SU/NNN35

Topic: J.03. Public Awareness of Neuroscience

Title: Neuromyths and learning myths: A science of learning intervention for teachers reduces misconceptions about teaching and learning

Authors: ***M. R. UNCAPHER**[1,2,3], M. K. THIEU[4], K. S. WEINER[4,3];
[1]Dept Psychol, Stanford Univ. Dept. of Psychology, Stanford, CA; [2]Neurol., Univ. of California San Francisco, San Francisco, CA; [3]Inst. for Applied Neurosci., Palo Alto, CA; [4]Psychology, Stanford Univ., Stanford, CA

Abstract: Recent investigations reveal that common misconceptions are shared among educators regarding how students learn and how the brain supports learning. For instance, three shared misconceptions among teachers polled internationally (UK, Netherlands, Turkey, Greece, and China) show that (1) ~80% believe differences in left-brain/right-brain dominance explain why

students learn differently, (2) ~96% believe that students learn better when they receive instruction in their preferred 'learning style' (e.g., auditory, visual, kinesthetic), and (3) ~50% believe students only use ten percent of their brain (Howard-Jones, 2014). Such beliefs can lead to ineffective teaching practices and misappropriated resources directed toward programs based on such misconceptions. We first investigated educator beliefs in the San Francisco Bay Area. We then conducted a science of learning intervention with education leaders and teachers to determine whether misconceptions can be remediated among in-service educators, particularly given recent findings that many common 'mythbusting' techniques actually increase misconceptions (Peter & Koch, 2016). The sample of education leaders (superintendents, principals, vice principals; n=48) served 16,000 K-12 students, and the sample of teachers (n=85) served 30,000 adult students. A 14-item teacher beliefs survey was administered prior to and following the science of learning intervention, and revealed similar levels of beliefs in learning myths and neuromyths as previously found in international samples. The intervention produced a striking reduction in misconceptions for topics discussed in the training, relative to misconceptions not discussed ($X2=40.68$, $p=1.8*10-10$). The strongest effect sizes were found for beliefs about learning styles (Cohen's $h=1.49$), left/right-brain learners ($h=1.05$), and using only ten percent of the brain ($h=.84$). These results suggest that this intervention methodology—deploying effective debunking methods and teaching science of learning principles—can be effective at remediating common teacher misconceptions, and may be a model to reduce misconceptions more broadly, both at national and international levels.
1.Howard-Jones, P.A. (2014) Nature Reviews Neuroscience. 1-8. 2.Peter, C. & Koch, T. (2016) Science Communication. 38(1): 3-25.

Disclosures: **M.R. Uncapher:** B. Contracted Research/Research Grant (principal investigator for a drug study, collaborator or consultant and pending and current grants). If you are a PI for a drug study, report that research relationship even if those funds come to an institution; Institute for Applied Neuroscience. **M.K. Thieu:** None. **K.S. Weiner:** B. Contracted Research/Research Grant (principal investigator for a drug study, collaborator or consultant and pending and current grants). If you are a PI for a drug study, report that research relationship even if those funds come to an institution; Institute for Applied Neuroscience.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.10SU/NNN36

Topic: J.03. Public Awareness of Neuroscience

Support: 2014 SFN Chapter Grant Award

2015 SFN Chapter Grant Award

Title: Establishing a student led neuroscience outreach program using human brain specimens in Detroit Public Schools

Authors: *M. J. LISIESKI[1], H. A. MARUSAK[2], S. A. PERRINE[1], T. FISCHER[3];
[1]Psychiatry and Behavioral Neurosci., Wayne State Univ. Sch. of Med., Detroit, MI; [2]Pharm. Practice, [3]Psychology, Wayne State Univ., Detroit, MI

Abstract: The Wayne State University Student Neuroscience Society is a collaborative group of graduate and undergraduate students interested in neuroscience at Wayne State in Detroit, Michigan. A primary goal of our group is to foster awareness of neuroscience and neuroscience-related opportunities at Wayne State and the surrounding community. Schools in the surrounding Detroit Public School District often struggle to provide students with enriched and hands-on learning experiences due to inadequate resources; therefore, we identified Detroit Public Schools as being in particular need of Science, Technology, Engineering, Mathematics (STEM) related outreach. To help address this need, we established a partnership with Cass Technical High School that has allowed us to do neuroscience presentations using preserved human brains in honors biology classes for the past two years. These presentations cover the basics of brain function and organization, and culminate with students having the opportunity to handle and examine human brain specimens under the supervision and guidance of graduate and undergraduate students. Special attention is paid to discussing topics relevant to high school students, such as methods of improving memory retention while studying, the importance of sleep for health, and the importance of sports safety in brain health. By taking advantage of this presentation format, which uses brain specimens from the Wayne State University School of Medicine cadaver dissection program and is otherwise supported by the Michigan Chapter of the Society for Neuroscience through Chapter Grants, we are able to provide a hands-on, highly interactive neuroscience learning experience to more than one hundred inner city high school students each year. This outreach format is accessible, engaging, inexpensive, and valuable to both the audience and demonstrators. Future work includes implementing measures of effectiveness and audience engagement and expanding this program to include more classes.

Disclosures: M.J. Lisieski: None. **H.A. Marusak:** None. **S.A. Perrine:** None. **T. Fischer:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.11SU/NNN37

Topic: J.03. Public Awareness of Neuroscience

Title: Memory challenge - a Brain Awareness Week activity

Authors: *J. E. OLSON[1], D. I. CLAFLIN[2];
[1]Dept Emergency Med., Wright State Univ. Boonshoft Sch. Med., Dayton, OH; [2]Psychology, Wright State Univ., Dayton, OH

Abstract: Effective learning is defined by the ability to retrieve information when needed. Memory consolidation and subsequent retrieval is dependent on the quality of the initial encoding of information. Through retrieval practice and effortful processing one can facilitate re-consolidation of the memory and improve long-term accessibility. Surveys have found that students' study habits often are aligned only with establishing the initial short-term memory trace while neglecting retrieval practice to improve long-term memory retrieval. Rote repetition of reading assignments, viewing video lectures, and highlighting texts does little to improve retention of course material once a memory trace has been established. The goals of this Brain Awareness Week activity are to reveal the vulnerability of short-term memories, demonstrate that material studied only once can create a memory trace, and show how retrieval and re-encoding can lay down permanent memories. A cohort of 151 high school students were shown an image of 18 "clip art" objects for 3 min while also listening to the speaker. They were then asked to describe as many of the objects as they can. Most students identified 3 or 4 objects, while those who described more than 8 objects reported using a mental pattern or anecdote to relate objects to each other. In another demonstration, a sequence of 25 randomized images of faces, landscapes, and architecture was shown to students at a rate of 4 sec/image. On average (±SEM), students predicted they would recognize only 45±2% of the images later. After a few minutes, students' recognition memory was assessed using the same 25 images paired to the left or the right with an image not previously seen. Students were asked to select the recently-viewed image from the pair. They chose correctly 92±1% of the time. In addition, faces were missed significantly less often than non-faces (6.7% versus 8.7%, $p<0.05$), demonstrating that encoding faces in memory is different somehow. These activities can precipitate class discussion about memory traces established with only a short exposure to images and why faces create stronger memories due perhaps to deeper encoding through associations with previous experiences. This demonstration can be extended to illustrate the value of re-retrieval and re-consolidation of information into more stable long-term memory. Participants shown 50 images followed by a recognition test of only 25 of the original images should recognize these more often on a subsequent recognition test (e.g. several days later), that includes all 50 original images. These simple memory tests can be powerful demonstrations to aid improving students' study habits.

Disclosures: J.E. Olson: None. **D.I. Claflin:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.12SU/NNN38

Topic: J.03. Public Awareness of Neuroscience

Support: Fac.Med. UNAL

Title: We must educate mothers for breastfeeding: Lactancy disruption as a possible risk factor for development of breast cancer tumors

Authors: D. G. GARCÍA-LAGUNA[1], M. F. GERENA-CRUZ[1], *Z. DUENAS[2];
[1]Ciencias Fisiológicas, Univ. Nacional de Colombia, Bogotá D.C., Colombia; [2]Univ. Nacional De Colombia, Bogota DC, Colombia

Abstract: Cancer is a disease of high incidence and multiple consequences worldwide. It has been investigated the several factors affecting cancer. Maternal separation during breastfeeding (MSDB) has been associated with anxiety and stress. Anxiety also has been related with the occurrence and development of cancer. Several studies using animal models have been developed showing the effects of MSDB in different systemic levels. However there are few reports studying the relationship between it and cancer development. The aim of this study was to determine the possible effect of MSDB on the development of cancer tumors induced by Dimethyl Benzo anthracene (DMBA). The MSDB protocol was performed in female Wistar rats, from postnatal day (PND) 1 to PND 21 for 360 minutes a day (180 minutes in the morning and 180 minutes in the afternoon), with light cycle reverse. On PND 22 pups were distributed by treatment; Group 1 (MSDB and DMBA), Group 2 (MSDB and vehicle), Group 3 (Not MSDB and DMBA) and Group 4 (No MSDB and vehicle). Carcinomas induction with DMBA compound and vehicle (sunflower oil and saline) respectively were performed through abdominal subdermal injection into the DPN 30. Monitoring was performed every 5 days through palpation and weight of each rat. The results show that animals treated with DMBA had alopecia (MSDB=81.8% and Control=72.7%), subdermal masses (MSDB=63.6% and Control=54.5%) and lacerations on the skin possibly associated with cancerous lesions (MSDB=36.4% and Control 9.1%). Groups without DMBA don't develop any of the previous signs. Histopathological analysis of tissues with possible cancerous masses is currently under studied. These results suggest that MSDB has a major incidence of the development of tumors induced through DMBA injection. Furthermore, changes in the skin of rats treated with DMBA were found, and may be, possibly associated with cancer.

Disclosures: D.G. García-Laguna: None. **M.F. Gerena-Cruz:** None. **Z. Duenas:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.13SU/NNN39

Topic: J.03. Public Awareness of Neuroscience

Title: A higher education training program that reduces students'stress and anxiety and improves behavioral regulation<!--endfragment-->

Authors: *M. BRESCIANI[1], M. EVRARD[2];
[1]San Diego State Univ., San Diego, CA; [2]SUNY Downstate, Brooklyn, NY

Abstract: The science behind learning and development has made substantial advancements in the past decade. However, these lessons have hardly been translated into the design, delivery, and assessment of higher education - an institution which has learning and development at its core. Currently the efficacy of higher education is being questioned as there are indications that graduates are not improving in many facets of learning and development. Emerging research posits that high levels of stress and anxiety impede on a student's learning ability, which was identified in our undergraduate population. In efforts to reduce stress and anxiety, a program was created using research in behavioral regulation (attention, emotion, and cognitive). These regulation strategies have shown to reduce activity in the amygdala (associated with stress) and increase activity in the hippocampus (associated with memory) and prefrontal cortex (associated with executive functions). Bresciani Ludvik (2016) reported that undergraduate and graduate students who had completed Integrative Inquiry (a training program designed to lower stress and anxiety and increase critical thinking dispositions) in its entirety, were able to decrease their stress and anxiety levels and increase their attention, emotion, and cognitive regulation, as well as their critical thinking dispositions. This study sought to replicate the 2016 study, however with doctoral students. Results indicate that doctoral students were able to learn emotion regulation and cognitive regulation. However, doctoral students did not significantly improve in their critical thinking dispositions or attention regulation, further, reported anxiety levels did not decrease. However, it is important to note that critical thinking dispositions were well above the national average prior to engaging in Integrative Inquiry leaving little room for improvement. Similarly, attention regulation did not improve but the pre-assessment revealed already high levels and thus left little room for improvement. Anxiety levels did not significantly decrease, however they did not increase as well, which suggests INIQ may have prevented the development of anxiety during the doctoral students' first semester. Taken together, by training the behavioral regulation strategies (attention, emotion, and cognitive regulation) individuals may be able to better manage their stress and anxiety, thus freeing up precious cognitive resources for other tasks.

Disclosures: **M. Bresciani:** None. **M. Evrard:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.14SU/NNN40

Topic: J.03. Public Awareness of Neuroscience

Support: SFN Chapter Grant

Title: Crafting young neuroscientists through educational outreach by FSU Neuroscience

Authors: *A. K. DENOBREGA, M. TABAA, K. KORSHUNOV, B. J. CARROLL, M. A. GREENWOOD, M. DONOVAN, J. BREWER, S. OGDEN;
Biol. Science, Program of Neurosci., Florida State Univ., Tallahassee, FL

Abstract: The Florida State University Neuroscience Program Outreach has become a staple within Leon County, increasing neuroscience awareness every year. During the 2015-16 academic year, graduate students visited high school classrooms, hosted the tenth annual *North Florida Brain Bee* and fifth annual *Brain Fair,* taught at elementary schools, and will participate in community educational events throughout the summer.

In the fall, we visited 28 classes at 4 different high schools and used hands-on demonstrations to teach about the five sensory systems and neuroanatomy. In total, we reached out to over 840 high school students. We also coordinated the *Friday Neuroscience Lectures*, a free 9-week course to prepare high school students for the *North Florida Brain Bee*. Held in early 2016, the *Brain Bee* attracted 30 participants not only from Leon County, but also from different cities in Florida, including Niceville, Jacksonville, and Miami. With funding provided by our program and generous contributors, the Brain Bee winner was sent to compete at the *USA National Brain Bee Championship* in Baltimore, MD.

In the spring, we held the *Brain Fair,* an open house event to educate K-12 students and their parents on basic neuroscience. Advertised with the theme, “MIND-CRAFT”, the event had 21 different activity stations including interactive demonstrations to teach students and their families about the basic functions of the brain, neurons, sensory systems, and the importance of neuroscience research. The *Brain Fair* attracted approximately 400 people from Leon County in combination with neighboring counties in north Florida and south Georgia. Further bolstering our efforts, we had significant volunteer contribution from our sister undergraduate organization, the Neuroscience Undergraduate Student Association (NUSA). After the *Brain Fair,* neuroscience graduate students visited 6 elementary school classes to introduce the brain to approximately 180 elementary school students.

In the summer, so far, we have reached approximately 300 people during Family Science Night which is a local community event where scientists from across fields conduct interactive demonstrations for children K-8 as well as their families. Sheep and human brains were

displayed at one booth, and EMGs were administered to participants at a second booth. Neuroscience graduate students explained brain structures and functions as well as basic neuroscience concepts throughout the event.
Supported by the 2015 SfN Chapter Grant, FSU Program in Neuroscience, Congress of Graduate Students, Student Government Association, and generous contributions from faculty and private donors.

Disclosures: **A.K. Denobrega:** None. **M. Tabaa:** None. **K. Korshunov:** None. **B.J. Carroll:** None. **M.A. Greenwood:** None. **M. Donovan:** None. **J. Brewer:** None. **S. Ogden:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.15SU/NNN41

Topic: J.03. Public Awareness of Neuroscience

Support: NIH Grant 1R25MH092912-01

Title: Best practices and achievements of the Neuroscience undergraduate training Program to Increase Diversity (NeuroID) at the University of Puerto Rico-Piedras

Authors: *C. S. MALDONADO-VLAAR[1], J. E. GARCIA ARRRARAS[2];
[2]Biol., [1]Univ. Puerto Rico, San Juan, PR

Abstract: The Neuroscience Research Opportunities to Increase Diversity (NeuroID) program from the University of Puerto Rico Rio Piedras Campus aims to increase the opportunities available for undergraduate students in the area of neurosciences. This program builds upon the experiences gathered during the current funding period to enhance and strengthen the mentoring and training activities of the NeuroID program, incorporating an emphasis in developing active-learning skills and strengthen emotional competence. NeuroID takes advantage of the strong neuroscience expertise among UPR investigators and fortifies the underlying neuroscience network that joins undergraduate students, island investigators and their collaborators in mainland institutions. The main goal of the NeuroID program is to increase diversity in the neurosciences by establishing a cohort of interested students that will receive academic and professional training in neuroscience-related research. The selected students will be Hispanics from different gender, race, social status and physical needs. The core of the program is a comprehensive research experience for undergraduate students based on a research-with-purpose training philosophy. The training program consists of three major components: (1) Research Experience: An intense research experience during the academic year and two research summer

experiences: one at the UPR and the other in a laboratory at an institution in the mainland USA that have active T32 training grants in neuroscience and/or excellent track record in recruiting and training underrepresented minorities. (2) Academic training: an academic program based on active learning activities, seminars, workshops and selected courses to enhance their knowledge in neurobiology, quantitative biology and understanding of a research career. (3) Student development activities - Participants will enter a mentoring program that includes community outreach activities, writing in science, oral presentations and career counseling to enhance their professional capabilities. The NeuroID program will extend the impact of other successful programs at the University of Puerto Rico, not only by focusing on the neuroscience field but also by greatly expanding the program to students from primarily-undergraduate institutions in the San Juan metropolitan areas, which increases the pool of available applicants as well as providing an inclusive and broader training program.

Disclosures: C.S. Maldonado-Vlaar: None. **J.E. Garcia Arrraras:** None.

Theme J Poster

025. Public Awareness of Neuroscience: Education

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 25.16SU/NNN42

Topic: J.03. Public Awareness of Neuroscience

Title: Research how the university student accepted “body and mind unifying science” education program

Authors: *Y. ATOMI[1], Y. HIGASHI[1], M. SHIMIZU[1], E. FUJITA[1], T. ATOMI[2], K. HASEGAWA[3];
[1]Dept of Material Hlth. Science, Fac. and Grad. Sch. of Engin., Tokyo Univ. of Agr. and Technol., Tokyo, Japan; [2]Dept. of Physical Therapy, Teikyo Univ. of Sci., Uenohara, Japan; [3]Inst. of Space and Astronautical Sci., Japan Aerospace Exploration Agency, Sagamihara, Japan

Abstract: Mind-body scientific relation has not been solved yet. Our body is composed of 37 trillion cells and extracellular matrix (ECM) that is produced by those cells. Education is materialized in accordance with protein turn-over associating dynamics of neuro-muscular systems and stress-responding system working activity-dependent manner against both natural and social stresses. Mindfulness practice, which may be a hint to abstract it. We focusing on dual dynamic instabilities of two levels of micro and macro real existences, that is, microtubule dynamics needing molecular chaperone against gravity stress, and human bipedalism, have developed the education program to know and controlling own human system and have reported the effects in previous SfN. This study introduces “body and mind unifying science program” for

26 university first-year students (Dept. of Technology), and shows the effects obtained by same 10 meta-questionnaires asking possibility of own life, human being, human society and technology and Japanese society and so on, performed at both pre- and post within each lesson through every and total 15 times during one semester and writing short report. The student checks the situation of these understanding selecting each of the five grades. Using these numerical values, educational effects were statistically analyzed. The comprehension of scientific knowledge, conception unifying body and brain/mind was measured from at both individual reports written in home and opinion presentation after group discussion. The results are as follows; repeating lesson times the value of understanding gradually increased. However, this change ratio at each time is not the same rising rate. 81% students exceed a medium value finally. This proportion answering positively almost corresponds to the content of final reports describing about body-mind unifying. Evaluation points was higher when students do by themselves experiment and oral presentation. The difference of the beginning and the last time of lesson were statistically significant ($P<0.001$). The correlation between meta-understanding and motivation to action was significant ($R=0.859$). We can penetrate into our real activities'motive considering into cell's mechanosensing abilities through ECM and their sustainability supported by molecular chaperones. Although human brain has been created abstract thinking, man-made culture and various sciences and technologies, educational effects (brain plasticity) are obtained through real activities stimulating cells. Human volition is realized with voluntary movement and passive tension development under the gravity.

Disclosures: **Y. Atomi:** None. **Y. Higashi:** None. **M. Shimizu:** None. **E. Fujita:** None. **T. Atomi:** None. **K. Hasegawa:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.01SU/NNN43

Topic: J.03. Public Awareness of Neuroscience

Support: SFN Chapter Grant

Title: Society for neuroscience Ottawa chapter - continued growth and success

Authors: ***K. FARMER**, A. THOMPSON, C. NESBITT, A. DEDEK, C. PASTRANA, Z. DWYER, R. HAY, S. COATES, K. DIXON, E. ALI, S. KING, R. WOODS, L. HYLAND, S.-B. PARK, J. LANDRIGAN, A. EDWARDS, N. TZAKIS, K. SZYSZKOWICZ, M. BEDARD, J. HOWELL, K. VENTURA, N. PROWSE, N. RUSTOM, C. RUDYK, U. SHANMUGA, A.

ABIZAID;
Neurosci., Carleton Univ., Ottawa, ON, Canada

Abstract: The Society for Neuroscience Ottawa Chapter has three main aims; to provide 1) community and 2) academic outreach programs, and 3) to form a consortium of neuroscience researchers in the Eastern Ontario region. With respect to our first aim, this year marked the fifth annual edition of the "Brain and Mental Health Art Show". A continuing and growing success, this show is hosted at a trendy downtown art gallery, and saw submissions from students at all levels from elementary school to graduate school, professors and medical doctors, and members of the community. Roughly 300 people attended the opening exhibition, and our silent auction raised $3500 for Ancoura, a local charity that provides low-cost community housing for individuals with mental illnesses. By bringing people from a diverse variety of backgrounds together, this event did a great deal to stimulate discussion and raise awareness about issues related to the brain and mental health. We also continued our successful Brain Awareness Week campaign, with over 60 volunteer presenters reaching approximately 3000 elementary and high school students in the Ottawa region. This year also marked the fourth annual Ottawa Brain Bee, where we bring together students from local high schools for a brain trivia competition. With respect our second and third aims, we are celebrating the start of Synapse, a new local ejournal connecting neuroscience students from across Eastern Ontario. Additionally, 2015 saw the expansion of the Ottawa Chapter to include all major research institutions in Ottawa. Together with Carleton University, the University of Ottawa, and The Royal Hospital, the Society for Neuroscience Ottawa Chapter hosted 3 city wide research conferences welcoming hundreds of neuroscience researchers to the capital region. Over the course of our many successful events, our primary goal has been to bring the research community and the public sector together, thereby raising awareness about neuroscience research, mental health, and the beauty that we see in the brain.

Disclosures: **K. Farmer:** None. **A. Thompson:** None. **C. Nesbitt:** None. **A. Dedek:** None. **C. Pastrana:** None. **Z. Dwyer:** None. **R. Hay:** None. **S. Coates:** None. **K. Dixon:** None. **E. Ali:** None. **S. King:** None. **R. Woods:** None. **L. Hyland:** None. **S. Park:** None. **J. Landrigan:** None. **A. Edwards:** None. **N. Tzakis:** None. **K. Szyszkowicz:** None. **M. Bedard:** None. **J. Howell:** None. **K. Ventura:** None. **N. Prowse:** None. **N. Rustom:** None. **C. Rudyk:** None. **U. Shanmuga:** None. **A. Abizaid:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.02SU/NNN44

Topic: J.03. Public Awareness of Neuroscience

Support: Undergraduate Program in Neuroscience Boston University

Title: Boston university's mind and brain society outreach exposes boston youth and families to neuroscience through undergraduate-run activities

Authors: *A. KOHLEY[1,2], P. LIPTON[2], S. HATTORI[2], N. ABRAHAM[2], T. LI[2];
[1]Boston Univ., Boston, MA; [2]Undergraduate Program In Neurosci. Boston Univ., Boston, MA

Abstract: The Mind and Brain Society at Boston University developed their Outreach program to introduce students of all ages to Neuroscience. The program, run entirely by undergraduate student volunteers, consists of three programs: 1) B.R.A.I.N. Day (Bringing Recognition and Interest to Neuroscience) 2) A Science Career Panel, and 3) Piece of Mind (Interactive Lessons for High School Classrooms). Our B.R.A.I.N. Day program consists of 18 interactive stations each investigating different aspects of the nervous system. We designed this event for middle school, high school, post-high school students, and their parents. B.R.A.I.N. Day includes stations such as traumatic brain injury music and the brain, neuroanatomy, Lego mindstorm robot, and the use of spikerboxes to listen to real action potentials. Through exit polls administered to participants, most attendees would recommend the event to others and felt that they learned a lot. In our second program, a science career panel we brought in professionals and graduate students who discussed their career path and important topics in neuroscience. Our third program, Piece of Mind, includes 1-hour interactive sessions in high school biology classrooms where we introduce students to communication in the nervous system, neuroanatomy, somatosensation, and brain machine interfaces. Through pre- and post-session assessments, 98.4% of participants enjoyed the interactive teaching and neuroscience topics even though their interest in pursuing science was low. Future plans for Mind and Brain Society Outreach include increasing the number of activities for B.R.A.I.N. Day, expanding our program in our current partner high schools, and establishing partnerships with two new high schools in the Boston area.

Disclosures: **A. Kohley:** None. **P. Lipton:** None. **S. Hattori:** None. **N. Abraham:** None. **T. Li:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.03SU/NNN45

Topic: J.03. Public Awareness of Neuroscience

Support: Shirley and Stefan Hatos Center for Neuropharmacology, UCLA

Brain Research Institute, UCLA

Title: DOPAteam: demystifying drugs through science communication

Authors: *A. B. THOMPSON[1], R. ROMERO-CALDERÓN[1], M. Y. IGUCHI[3], C. EVANS[2]; [1]Psychology, [2]Brain Res. Inst., UCLA, Los Angeles, CA; [3]Drug Policy Res. Ctr., RAND Corp., Santa Monica, CA

Abstract: Many adult users of illicit drugs begin taking drugs in adolescence, making this time point an attractive target for intervention programs attempting to alleviate the burden of drug use on society. The Drug Abuse Resistance Education (D.A.R.E.) program, a common abstinence-promoting program aimed at young students, has been found ineffective in reducing drug abuse among teenagers (Ennett et al. 1994, West & O'Neal, 2004), yet until recently remained the most widely used abuse prevention program in schools (Kumar et al. 2013). Several novel science-based drug abuse prevention programs have seen moderate success recently, including the "keepin' it REAL" curriculum and UNODC's "Listen First" campaign, however these programs target middle school students and adults, respectively. We therefore set out to create a drug use intervention program for use in high schools in our local community. Our program focuses on teaching basic neuroscience to high school students and explaining the neurobiology behind abused drugs, with the aim to clarify misconceptions about drugs and promote an awareness of addiction as a disease of the mind. To accomplish this, we encouraged UCLA undergraduates enrolled in a course on the neurobiology of drugs of abuse to participate in a new follow-up field course, in which they design educational presentations and engaging activities to teach about drugs of abuse to local high school students. Graded course assignments include: 1) designing a 10 minute informative PowerPoint presentation, 2) writing a detailed proposal and budget for a hands-on activity, 3) modifying pre-existing drug presentations to appropriately target a high school audience and 4) crafting a brief instructive pamphlet on a chosen drug. In the process of preparing these materials, the students gained valuable experience as science communicators; they learned techniques to effectively target a particular audience, to avoid jargon without obscuring meaning, and to clearly convey a concise message. The final two weeks of the quarter included visits to local high schools, at which the students gave their presentations and set up their activities. Since our program is designed to have students teaching fellow students, we anticipate that the material will be openly received. We assessed the short term effectiveness of the program with a pair of surveys administered prior to and after our visit. All materials created for the course were uploaded to a website (http://www.bri.ucla.edu/outreach/drug-abuse-and-society) to allow easy access to the resources by teachers and students. This program is very flexible and can be implemented easily into existing drug education curricula.

Disclosures: A.B. Thompson: None. **R. Romero-Calderón:** None. **M.Y. Iguchi:** None. **C. Evans:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.04SU/NNN46

Topic: J.03. Public Awareness of Neuroscience

Support: Portland Alcohol Research Center @ OHSU

GEAR UP

US Bank

Title: NW Noggin: Arts-integrated neuroscience outreach from the northwest to DC

Authors: *W. S. GRIESAR, J. LEAKE;
Neurosci., Washington State Univ. Vancouver, Vancouver, WA

Abstract: Science needs investment, and engaging the public is key to relating discoveries and building support for education and research. Arts integration in STEM ("STEAM") fosters engagement. Here we report on efforts to reach K-12 students and the public about brain research from the Pacific Northwest to DC. There are few experiences as rewarding as answering questions from homeless youth who want to learn about their brains and sleep, anxiety, and drugs, or creating an art museum installation explaining the neuroscience of visual perception with the help of images from the Allen Institute for Brain Science. We've created these opportunities through NW Noggin, cooperating universities who reach out like neurons to form links, and share resources and expertise. We bring graduates, undergraduates, K-12 students, scientists and artists together to collaborate, and prepare young people to explain the brain through arts in formal and informal settings. Our volunteers from WSU Vancouver, Portland State, and Oregon Health & Sciences University have taught in schools, theaters, museums, symphonies, homeless centers, breweries, and bike shop pubs! Since 2012, we've worked with more than 9,000 academic priority students in our region! We've offered talks from students in neuroscience and art at Portland's Velo Cult, and last year informed more than 750 about research, training graduates to present their work to a lay audience. In 2016 we took 26 volunteers to Washington, DC for exceptional, high profile experience presenting on brains and art to members of both houses of Congress, the Office of Science and Technology Policy at the White House, fourth graders at two Title I public schools, and visitors to the Phillips Collection! We were invited to Congress by the Neuroscience and STEAM caucuses in the House, and by the Health, Education, Labor & Pensions committee in the Senate. The American Brain Coalition provided brains for Noggin events, and coordinated a House reception, sponsored by WSU, PSU, OHSU, the Portland Art Museum, and the Phillips. We also ran "Neuroscience Night" at the Phillips, in conjunction with the "Seeing Nature" exhibit of landscape paintings. NW Noggin

contributed text, graphics and educational materials to this exhibit when it opened at the Portland Art Museum in fall 2015, for "The Nature of Seeing," an associated gallery focused on the neuroscience of vision. Building excitement and awareness of discoveries in neuroscience through arts-integrated outreach across institutional, state, federal and generational lines trains new scientists to collaborate, and communicate, and increases awareness and support for further investment in brain research.

Disclosures: W.S. Griesar: None. **J. Leake:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.05SU/NNN47

Topic: J.03. Public Awareness of Neuroscience

Title: Raising awareness of the dangers of traumatic brain injuries as a part of the Brain Program conducted by the Pittsburgh chapter of the Society for Neuroscience

Authors: *H. L. RADABAUGH[1], C. O. BONDI[2], R. S. TURNER[3], A. E. KLINE[2];
[1]Physical Med. and Rehabil., Univ. of Pittsburgh, Safar Ctr. For Resusci, Pittsburgh, PA; [2]Physical Med. and Rehabil., Univ. of Pittsburgh, Safar Ctr. For Resuscitation Res., Pittsburgh, PA; [3]Dept. of Neurobio., Univ. of Pittsburgh, Pittsburgh, PA

Abstract: The Society for Neuroscience, Pittsburgh chapter has a longstanding outreach initiative known as the Brain Program. The Brain Program consists of a number of different interactive stations that span multiple disciplines of the neuroscience field including motor systems, the importance of animal models, mental disorders, feeding behaviors, and electrophysiology. Student groups rotate from one station to the next, learning about core concepts in neuroscience, meeting with neuroscientists, and discussing the information they are learning. Presenters travel to 20 or more middle and high schools each year to promote neuroscience awareness that reaches approximately 1000 students of all social and economic strata in Western Pennsylvania. In 2013, Dr. Corina Bondi founded a station dedicated to informing the students about the dangers of, and the research being conducted on, traumatic brain injuries (TBI). In January of 2015, I became involved with the presentation of the TBI station. Since then, I have become a leader in presenting the station by attending the majority of schools and training other students to present TBI in a way that informs and educates teenage students. To do this, we begin by explaining what types of insults result in TBIs and what symptoms may occur after mild to severe injuries. We then utilize a helmet and egg to demonstrate the effectiveness of helmets with the goal of promoting habits that will prevent head

injuries. To end the presentation, we discuss the research that we personally do at the Safar Center for Resuscitation Research at the University of Pittsburgh in search of treatments that effect functional recovery after TBI. As an undergraduate presenting to students not much younger than myself, I have found involvement in this station to be exceptionally rewarding. I am able to share with the students things I have learned and opportunities that I have been given as an undergraduate researcher that sparked my passion for neuroscience. By sharing my own experience, I am able to not only facilitate interest in the field but also inform the students of potential opportunities that could become a part of their upcoming college experience and, ultimately, their career paths.

Disclosures: H.L. Radabaugh: None. **C.O. Bondi:** None. **R.S. Turner:** None. **A.E. Kline:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.06SU/NNN48

Topic: J.03. Public Awareness of Neuroscience

Support: UCLA OID Pilot Grant

Title: Neuroscience outreach to the greater Los Angeles K-12 community

Authors: K. Y. CHENG[1], E. M. SPARCK[2], C. YAEGER[1], C. A. GHIANI[3], W. GE[3], *E. M. CARPENTER[3];
[1]Neurosci. Interdepartmental Program, [2]Dept. of Psychology, UCLA, Los Angeles, CA; [3]Dept. of Psychiatry and Biobehavioral Sci., UCLA Sch. Med., Los Angeles, CA

Abstract: Project Brainstorm (PB) and Brain Awareness Week (BAW) are two science outreach programs sponsored by the UCLA Brain Research Institute. Both programs target Title I schools, where few students express interest in pursuing higher education and the sciences. The goal of both PB and BAW is to teach neuroscience to K-12 students and to inspire scientific interest. While PB visits schools located in the greater Los Angeles community, BAW invites five separate schools to the UCLA campus for a full day of science-related hands-on activities. As a UCLA field course (NS192B), PB is offered to 3rd and 4th year undergraduates in the Neuroscience Interdepartmental Program to allow them to gain experience teaching neuroscience concepts to K-12 students. Undergraduates design interactive lesson plans that integrate fundamental neuroscience principles with their chosen topics, such as neuroplasticity or stress. During the first half of the course, undergraduates receive feedback from peers, graduate

students and faculty in order to improve their teaching skills. Then the students visit classrooms in elementary, middle and high schools to present their lesson plans. 21 undergraduates enrolled in PB in 2016; 7 of these students were also enrolled in a teaching-focused capstone that included additional journal clubs and a poster presentation at the annual UCLA Neuroscience Poster Day. More than 250 K-12 students from two high schools, two middle schools and one elementary school participated in this year's BAW, which took place March 7-11, 2016. Each day began with hands-on demonstrations that illustrated basic neuroscience principles. Two new activities - sheep brain dissections and presentations focused on popular neuroscience topics such as phantom limb syndrome - were added to improve the program this year. Visiting students also participated in lab tours that included hands-on activities such as DNA extraction from cheek cells, behavior conditioning, and viewing aplysia. High school students participated in career panels with current UCLA faculty and students about college admissions and attendance. Based on verbal feedback and written evaluations, visiting students enjoyed the myriad activities offered by the event. The efficacy of PB and BAW is assessed through the use of pretest/posttest evaluations. Preliminary analysis shows both outreach programs have been effective in communicating neuroscience to a young audience and instilling a more positive attitude toward science.

Disclosures: **K.Y. Cheng:** None. **E.M. Sparck:** None. **C. Yaeger:** None. **C.A. Ghiani:** None. **W. Ge:** None. **E.M. Carpenter:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.07SU/NNN49

Topic: J.03. Public Awareness of Neuroscience

Title: Science for incarcerated teens: a new horizon for STEM enrichment

Authors: *S. A. FLEMING[1,2], S. M. MATT[2], J. L. SEYMOUR[2], E. G. CENTER[3], I. M. TRANIELLO[2];
[1]Animal Sci., [2]Neurosci. Program, [3]Psychology, Univ. of Illinois at Urbana-Champaign, Urbana, IL

Abstract: While substantial effort has been invested in STEM enrichment among K-12 students and the general public, incarcerated teens rarely access the benefits of STEM outreach. To foster scientific literacy and critical thought among an often vulnerable and marginalized population, we have established a weekly science curriculum with incarcerated teens in Champaign County, IL. These students, ages 10-17, are systematically excluded from community engagement events

sponsored by local universities, and have limited access to materials for self-exploration of science. This leaves an already educationally underserved population at an extreme disadvantage relative to their peers in regard to obtaining academic success and experiencing excitement in science. Our group meets with incarcerated youth at the Champaign County Juvenile Detention Center (JDC) every week for two 45-minute science-themed discussions, coined "Science Mondays". As these teens are not provided with a science curriculum (including labs) in their typical class schedule or with other volunteer groups, this represents the first and only outreach effort of its kind to bring science to the JDC. During these meetings, we facilitate discussion on college-level science topics such as neuroplasticity, nutrition and the brain, attention, and identity. Furthermore, we conduct hands-on labs where students are allowed to take part in extracting DNA from their own saliva, exploring the physiology of their senses, and handling real brain tissue. Although these efforts reach a relatively small group, through our collective experience we have developed a model to revolutionize STEM enrichment by working directly and consistently with vulnerable populations within a community to share the importance of scientific thought and the thrill of discovery.

Disclosures: S.A. Fleming: None. **S.M. Matt:** None. **J.L. Seymour:** None. **E.G. Center:** None. **I.M. Traniello:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.08SU/NNN50

Topic: J.03. Public Awareness of Neuroscience

Support: Bloomsburg University College of Liberal Arts Curricular Enhancement Grant

Title: Brain Awareness Week outreach to fifth through twelfth grade students by Psychology undergraduate students

Authors: *J. A. JOHNSON, E. L. FUNK, E. F. MATUSZ, J. F. MINNICH;
Psychology, Bloomsburg Univ., Bloomsburg, PA

Abstract: Bloomsburg University participated in its 6th annual Brain Awareness Week during two weeks in March of 2016. The outreach program consisted of visiting six local schools within the community. Three senior Psychology majors developed a variety of age-appropriate and fun interactive activities to teach local school students about neuroscience and the brain. The three students then trained about 75 undergraduate students, primarily Psychology majors and minors, to present the activities during Brain Awareness Week. The volunteers taught 400 local school

students about the brain and completed over 400 hours community service. For the Elementary school visits, six age-appropriate 7-minute activities were developed for small groups of 5th grade students (author JFM). Students rotated from activity to activity until completing them all. The activities included Brain Plasticity (prism goggle activity), Animal Brains (guessing size and weight), Taste and Smell (Skittle activity), What's in the Box? (using the senses), Now you See It (eye and occipital lobe), and Braille (plasticity in the blind). The 5th grade students rated their overall enjoyment of the activities 9.7 out of 10. Also, they chose Brain Plasticity as well as Taste and Smell as their favorite activities. For the Middle School visits, six age-appropriate 7-minute activities were developed for small groups of 6th, 7th, and 8th grade students (author ELF). The activities included Visual Illusions, Dreaming (does not reveal the unconscious but lucid dreaming is possible), Attention (the networks in the brain and an attention quiz), Jello Mania (influence of visual information on flavor perception), Memory Mnemonics, and Brain Plasticity (prism goggle activity). Students rated their overall enjoyment of the activities 9 out of 10, and chose Jello Mania as their favorite activity. For the High School visit, the activities included Dreaming (similar to the Middle School version), Alzheimer's Disease, ADHD, Neurogenesis, Are you a Good Eyewitness?, and Sheep brains (authored by EMF). Students rated their overall enjoyment of the program 8.5 out of 10. Are you a Good Eyewitness? was rated the most popular activity. Undergraduate volunteers reported very high enjoyment participating in the program (9.4 out of 10). Volunteers also reported a high level of learning about neuroscience concepts (8.7 out of 10), and reported value in working with children, practicing public speaking, and working with their peers. We intend to continue developing fun, interactive activities to teach local school children about the brain and neuroscience during future Brain Awareness Weeks.

Disclosures: J.A. Johnson: None. **E.L. Funk:** None. **E.F. Matusz:** None. **J.F. Minnich:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.09SU/NNN51

Topic: J.03. Public Awareness of Neuroscience

Title: Augustana College 'NeurdFest': A neuroscience outreach event that impacts both elementary school-age attendees and undergraduate volunteers

Authors: *S. STOUGH, L. NGUYEN, P. STRELL, S. TODOROV;
Psychology, Augustana Col., Rock Island, IL

Abstract: This was the second annual offering of NeurdFest, a neuroscience outreach event organized to coincide with the Celebration of Learning, a campus-wide all-day symposium

designated to showcase research and scholarship by students and faculty at Augustana College. We believe the best way to celebrate learning is to share it with others. Fifty-two second graders from Longfellow Liberal Arts School in Rock Island, IL attended the two-hour event at Augustana College. Nine undergraduate student volunteers and four faculty members from Neuroscience, Psychology, and Biology organized the event. Attendees rotated in groups of 13 through four different interactive stations focused on neural communication, perception and plasticity, brain safety, and basic neuroanatomy. Hands-on activities during the two-hour event included: using a ruler-drop reaction-time activity to discuss action potential conduction and neural communication, using prism goggles and a bean-bag toss to demonstrate sensory processing and adaptation, having students design helmets for an egg-drop activity to discuss brain safety, and using sheep brains and coloring activities to discuss the function of different lobes of the brain and overall brain organization. The primary goal of this outreach event was to teach elementary students about the brain using fun and engaging activities and to spark their desire to learn more. These second graders overwhelmingly reported that they learned a lot about the brain, that they would be likely to tell their friends and family about what they learned, that they think it would be fun to work as a scientist, and that they would like to go to college to learn more about the brain. Another important outcome of the event was the impact that it had on undergraduate volunteers. Students noted a strong increase in their interest in participating in future outreach to inform the general public about the brain and reported that the experience increased their perception of themselves as a member of the professional neuroscience community. Other benefits that students noted included improved communication skills, enhanced relationships with faculty members outside of the classroom, reinforcement of neuroscience content and concepts learned in class, increased confidence in presenting scientific information to the general public, and increased connection with other undergraduate students who are interested in the brain.

Disclosures: **S. Stough:** None. **L. Nguyen:** None. **P. Strell:** None. **S. Todorov:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.10SU/NNN52

Topic: J.03. Public Awareness of Neuroscience

Title: Neuroscience outreach by the Louisville Chapter

Authors: *K. K. RAU[1], C. CORBITT[2], D. HOWLAND[3], P. MOORE[4], P. SCOTT[5], T. STOICA[6], C. STEADMAN[4], B. BORGHUIS[4], J. PETRUSKA[4];

[1]Dept. of Anesthesiol., [2]Dept. of Biol., [3]Dept. of Neurosurg., [4]Dept. of Anatom. Sci. and Neurobio., [5]Dept. of Ophthalmology and Visual Sci., [6]Dept. of Psychological and Brain Sci., Univ. of Louisville, Louisville, KY

Abstract: Over the past year, the Louisville Chapter has broadened our neuroscience outreach efforts to educate the Northern Kentucky/Southern Indiana community (for more information, see https://louisville.edu/org/sfn/): 1) Students from a local high school toured laboratories of the Kentucky Spinal Cord Injury Research Center, and listened to faculty-led discussions regarding their research programs, scientific philosophies, the care and ethics related to the use of research animals, the role of laboratories in science and translational medicine, and their personal academic journeys from high school to their current positions. The visiting students also were given a presentation on comparative neuroanatomy and engaged in a hands-on experience in which they could compare and dissect mouse, rat and sheep brains. 2) We established a collaboration with the Kentucky Science Center (KSC) to highlight neuroscience during their NanoDays event. We had several modules, including a comparative neuroanatomy module, several microscopy modules, and a module for the younger visitors to color sheets showing the brain and neurons. 3) For Brain Awareness Week, we held an event at the KSC that was similar in content to Nanodays, but also included an electrophysiology demonstration, providing kids the opportunity to see electromyography recordings of their own muscles in action. Our university's Willed Body Program also allowed us to borrow a human brain to show to visitors. 4) We also participated in the KSC's Youth Science Summit, which involved day-long STEM-intensive events for middle and high school students. Our group participated in a career advice mentoring session, and presented an interactive talk and demo. 5) We participated twice in Scientific Proofs, which is an adult science seminar series that is hosted monthly at a local pub, the Goodwood Brewing Company. We presented talks entitled, "Of Mice and Men: The bench to bedside efforts to improve the quality of life of people with spinal cord injury," and "Turned on: the neuroscience of sexual function". 6) We helped mentor several participants, as well as provided judges for local science fairs. Collectively, 43 trainees and 24 faculty members from our chapter volunteered over 350 hours, and our programs reached more than 7000 individuals during the course of these outreach events. We have recently added Outreach Coordinator positions to our chapter's board, in order to maintain our high level of commitment to outreach, and to broaden our efforts. Future projects will target economically disadvantaged student populations in our community, as well as encourage minorities and women to consider neuroscience as future careers.

Disclosures: K.K. Rau: None. **C. Corbitt:** None. **D. Howland:** None. **P. Moore:** None. **P. Scott:** None. **T. Stoica:** None. **C. Steadman:** None. **B. Borghuis:** None. **J. Petruska:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.11SU/OOO1

Topic: J.03. Public Awareness of Neuroscience

Support: The Graduate School Community Building Grant

Title: Northwestern University brain awareness outreach promotes neuroscience education in the Chicago community

Authors: *L. K. SHANAHAN, N. M. FREDERICK, É. B. RYAN, N. E. BUSH, S. R. MCIVER;
Northwestern Univ., Chicago, IL

Abstract: Northwestern University Brain Awareness Outreach (NUBAO) is a graduate student-led initiative that aims to educate the Chicago community about neuroscience through the use of fun, interactive activities and demonstrations. Founded in 2010, NUBAO includes graduate and undergraduate students, postdoctoral fellows, and research staff representing a wide range of scientific disciplines at Northwestern University. NUBAO organizes three major outreach events each academic year in an effort to reach audiences with varying levels of exposure to neuroscience topics. 1) The annual Brain Awareness Fair is an open-house style event where K-8 students and their families learn about the brain. This year's Brain Awareness Fair was held at Lake View High School, where 80 NUBAO volunteers ran 23 interactive booths that demonstrated a variety of neuroscience concepts. This year's event was the largest yet, attracting ~750 attendees from ~100 Chicago schools. 2) In partnership with the Chicago Chapter of SfN, NUBAO hosts an annual Brain Awareness Teachers Workshop. Held for the 4th consecutive year, the Teachers Workshop is a professional development event where middle school and high school science educators learn about neuroscience in a way that can be easily integrated into their classrooms. This year's event featured guest lectures about learning and memory, as well as four teaching modules: neuroanatomy, smell and taste, the sensorimotor system, and motor adaptation. A record number of 38 science educators attended this year's event, and attendees earned continuing professional development units for participating. 3) For the second year, NUBAO partnered with Walter Payton High School to implement a 16-week neuroscience seminar series. Graduate students were invited to present an interactive lecture on a neuroscience topic of their choosing, often related to their thesis work. The goal of the seminar series was to expose high school students to the exciting field of neuroscience research in an effort to inspire them to pursue higher education in STEM fields. In addition to the three initiatives described above, NUBAO participates in a number of satellite events over the course the year. For example, this year NUBAO presented neuroscience demonstrations at Adler Planetarium for an after-dark event, and NUBAO graduate student volunteers took part in a panel discussion to share their experiences with undergraduate students majoring in neuroscience. Through this multi-tiered approach, NUBAO manages to make neuroscience accessible to various audiences in the Chicago community, and NUBAO volunteers benefit from the opportunity to communicate science on multiple levels.

Disclosures: **L.K. Shanahan:** None. **N.M. Frederick:** None. **É.B. Ryan:** None. **N.E. Bush:** None. **S.R. McIver:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.12SU/DP10 (Dynamic Poster)

Topic: J.03. Public Awareness of Neuroscience

Title: NIH contributions to the BRAIN Initiative

Authors: A. ADAMS[1], B. CUTHBERT[2], G. FARBER[2], W. KOROSHETZ[2], M. MOTT[2], K. RAMOS[1], N. TALLEY[2], *S. L. WHITE[1], A. WILLARD[2];
[1]Office of Scientific Liaison, [2]NIH, Bethesda, MD

Abstract: The **B**rain **R**esearch through **A**dvancing **I**nnovative **N**eurotechnologies (***BRAIN***) Initiative® aims to revolutionize our understanding of the human brain by accelerating the development and application of innovative neurotechnologies. The National Institutes of Health (NIH) collaborates with multiple U.S. federal and non-federal partners who are invested in the initiative, and has also developed partnerships with international groups. To guide NIH, the BRAIN Working Group of the Advisory Committee to the NIH Director developed "*BRAIN 2025: A Scientific Vision.*" A roadmap to reach the long-term goals of BRAIN at NIH, *BRAIN 2025* focuses on seven scientific priorities involving mapping the circuits of the brain, measuring the fluctuating patterns of electrical and chemical activity flowing within those circuits, and understanding how their interplay creates cognitive and behavioral capabilities. The NIH BRAIN Multi-Council Working Group (MCWG), which includes *ex officio* representatives from federal agency partners as well as external scientific advisors from the 10 Institutes and Centers (ICs) that contribute to BRAIN at NIH, provides input and guidance for on-going scientific plans. Within the MCWG, the NIH has also established a Neuroethics Workgroup, to recommend overall approaches for how research programs in BRAIN might handle issues and problems involving ethics. NIH Funding Opportunity Announcements (FOAs) issued for BRAIN are based on careful consideration of the recommendations of the *BRAIN 2025* report, input from the MCWG, and iterative discussions by trans-NIH staff and leadership.
Further, by hosting an annual Investigators Meeting, co-sponsoring a public satellite event at the Society for Neuroscience conference each year, participating in The BRAIN Initiative Alliance with other federal and non-federal organizations, and by participation of its BRAIN leadership at interdisciplinary scientific meetings, NIH provides an infrastructure for regular interactions and collaborations across the interface of BRAIN programmatic and investigator participants. This

poster will highlight scientific advancements, funding opportunities, and the myriad partnerships that constitute NIH's contribution to BRAIN. Additional details and updates on funding opportunities and events related to the NIH BRAIN Initiative are routinely published on the website www.braininitiative.nih.gov.

Disclosures: **A. Adams:** A. Employment/Salary (full or part-time): National Institutes of Health. **B. Cuthbert:** A. Employment/Salary (full or part-time): National Institutes of Health. **G. Farber:** A. Employment/Salary (full or part-time): National Institutes of Health. **W. Koroshetz:** A. Employment/Salary (full or part-time): National Institutes of Health. **M. Mott:** A. Employment/Salary (full or part-time): National Institutes of Health. **K. Ramos:** A. Employment/Salary (full or part-time): National Institutes of Health. **N. Talley:** A. Employment/Salary (full or part-time): National Institutes of Health. **S.L. White:** A. Employment/Salary (full or part-time): National Institutes of Health. **A. Willard:** A. Employment/Salary (full or part-time): National Institutes of Health.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.13SU/OOO2

Topic: J.03. Public Awareness of Neuroscience

Support: Financial support from Mahoney Institute for Neurosciences (Penn)

Title: Graduate-led outreach initiatives: improving neuroscience literacy in children and adults

Authors: ***D. REINER**, K. L. CHRISTISON-LAGAY, K. FOLWEILER, M. HEALEY, J. B. KAHN, P. MURPHY, T. PARTHASARATHI, I. J. PERRON, M. M. TAYLOR;
Univ. of Pennsylvania, Philadelphia, PA

Abstract: Communication with the public about science in general, and neuroscience specifically, has become increasingly important. The graduate students in the Neuroscience Graduate Group (NGG) at the University of Pennsylvania feel it is incumbent upon scientists to help foster greater scientific literacy through a diversity of forms. With the generous support of the Mahoney Institute for Neurosciences (MINS), the NGG Graduate-Led Initiatives and Activities (GLIA) committee coordinates outreach efforts broadly classified in two categories: 1. outreach to K-12 students and 2. outreach for non-scientist adults. NGG students have been leading outreach initiatives for young students for over a decade. Each year, we present interactive neuroscience demos to elementary school students at Penn's annual "Kids Judge!" event and tutor high school students for the regional Brain Bee competition. This summer will

mark our fifteenth year teaching a neuroscience course to at risk high school students in Penn's Upward Bound program. In 2014, we published the curriculum for this course as *Neuroscience: A Primer* (available on Amazon). More recently, we have branched out to also teaching local elementary school students and are developing a K-3 edition of our Primer to aid in those lessons. We have also expanded our outreach efforts to non-scientist adults with the goal of sharing exciting neuroscience findings and their relevance to the public. The longest- standing of these efforts is our bi-annual Neuroscience Public Lecture series, which features TED-style talks from Penn faculty, and attracts audiences of over 200 people with diverse, non-scientific backgrounds. In addition, our newly established website *Brains in Briefs* (www.knowyourmind.org/brainsinbriefs) provides easy-to-understand summaries of papers authored by NGG students with an emphasis on context of the work in the field and relevance to public health. We hope that GLIA activities improve public neuroscience literacy, and that such improvements will positively impact the future of neuroscience research at multiple levels, which include sharing the joys of learning how the brain works, helping interest the next generation of scientists, and increasing public support of scientific funding. We urge our colleagues to develop similar outreach programs at their institutions to help realize these hopes.

Disclosures: D. Reiner: None. **K.L. Christison-Lagay:** None. **K. Folweiler:** None. **M. Healey:** None. **J.B. Kahn:** None. **P. Murphy:** None. **T. Parthasarathi:** None. **I.J. Perron:** None. **M.M. Taylor:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.14SU/OOO3

Topic: J.03. Public Awareness of Neuroscience

Support: NIH P60 AA011605

UNC Bowles Center for Alcohol Studies

Title: Protect the brain - concussion! An interactive exhibit for Brain Awareness Week and beyond

Authors: *D. L. ROBINSON[1], J. BESHEER[2];
[1]Bowles Ctr. for Alcohol Studies, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC;
[2]Dept. of Psychiatry, Univ. of North Carolina, Chapel Hill, NC

Abstract: Concussions are in the news as scientists and the public are learning how repeated concussions from sports or occupation can lead to permanent brain damage. For Brain Awareness Week, faculty from the UNC Bowles Center for Alcohol Studies organized an interactive exhibit "Protect the Brain - Concussion!" as a platform for the community to learn about concussions, neuroscience and brain health. The main event was held at a local science museum, the North Carolina Museum of Life and Science (http://www.ncmls.org/), in a hands-on laboratory exhibit area. Visitors from across the region were introduced to the lab via a 30-s video (continuously looped on a prominent LCD screen) illustrating how concussive damage occurs after a blow to the head. Once visitors entered the lab area, they first explored the human brain by observing and touching a postmortem human brain and a brain/skull model. Scientists talked with visitors about which parts of the brain control various senses or functions, and what might happen if the brain was concussed. Next, scientists asked the visitors - what do you think would happen if your occipital lobe was damaged? We used distortion goggles that simulated the double vision and imbalance that might arise after concussion. Visitors performed gross and fine motor skills (e.g., walking a straight line; placing a peg in a hole board) with and without the goggles to experience the debilitating effects of the distortion. The exhibit was staffed by 26 scientists and students from UNC and approximately 430 children and 230 adults came through the exhibit over the 6 days (4 hr/day). Next, we adapted the activity to an outdoor venue at the UNC Science Expo, part of the state-wide North Carolina Science Festival. We showed animal brains in jars, the human brain/skull models and used the concussion goggles. At all events, brochures from SAMSHA and the National Institute on Alcohol Abuse and Alcoholism were distributed and conversations on science outreach and brain health (wearing a helmet, eating healthy food, protecting our brains from drugs and alcohol) were encouraged.

Disclosures: D.L. Robinson: None. **J. Besheer:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.15SU/OOO4

Topic: J.03. Public Awareness of Neuroscience

Support: University of Utah Neuroscience Initiative

National Science Foundation Graduate Research Fellowship

American Association for the Care of Children

Herman Hooten, MSW Health Equity and Inclusion Travel Stipend

Society for the Advancement of Chicanos and Native Americans in Sciences

Title: Neuroscience in Nicaragua: bringing brain awareness to developing nations

Authors: *E. RATZAN[1], P. PARKER[2], J. SIMCOX[3], D. CHAVEZ[4];
[1]Neurobio. and Anat., [2]Neurol., [3]Biochem., [4]Human Genet., Univ. of Utah, Salt Lake City, UT

Abstract: Public outreach events in neuroscience, such as Brain Awareness Week, provide education in brain function and research to lay-individuals. They can also provide students a model for building education programs in developing or impoverished communities locally and internationally. We present a pilot program expanding our continued brain education outreach locally in Salt Lake City, UT to the rural regions of Jalapa and Ocotal, Nicaragua. The program in Nicaragua revolved around two conferences: one organized for local university students, educators, and healthcare professionals and general community members, including local farmers from the forest/jungles surrounding Jalapa. We surveyed 274 participants' knowledge of brain function and general health prior to and following the conferences. As expected, we found varied breadth of knowledge and access to education in participants. Illiteracy was pervasive within the general public, though we found a great interest in neuroscience topics applicability to participants' daily life. This included neural and fetal development as it applied to pregnancy, phantom limbs, functional anatomy and basic knowledge in stroke and head trauma. We also found a need for education in general health topics, including basic nutrition and dietary practices, such as cooking and refrigeration of foods to avoid contamination. Many of the lectures and modules implemented in Nicaragua are also applicable to local Spanish speaking communities and required little adaptation. This pilot serves as a model for extending local education practices to international communities as well as locally underrepresented communities.

Disclosures: **E. Ratzan:** None. **P. Parker:** None. **J. Simcox:** None. **D. Chavez:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.16SU/OOO5

Topic: J.03. Public Awareness of Neuroscience

Support: NIH 1 P20 GM103643-01A1

Dana Alliance

Michael T. Goulet Foundation

Corning Foundation

Spectrum Medical Group

AAAS

Red Ribbon Committee-Biddeford Saco Rotary

Title: UNE's center for excellence in the neurosciences k-12 neuroscience outreach program: investigating strategies that support science competency and neuroscience awareness among youth

Authors: *E. J. BILSKY[1], B. POTTHOFF[1], J. MALON[1], D. LANDRY[1], M. DIONNE[2], J. RAY[3], I. MENG[1], M. BURMAN[1];
[1]Biomed. Sci., Univ. of New England, Biddeford, ME; [2]LearningWorks Afterschool Biddeford, Biddeford, ME; [3]Superintendent's Office, Biddeford Sch. Syst., Biddeford, ME

Abstract: The University of New England (UNE) has created a robust and comprehensive K-12 neuroscience outreach program that explores the strategies and approaches that support science competency among youth while promoting Brain Awareness and Brain Safety. The program uses the nervous system as a "hook", a partnership-based model for efficiency and impact, and an innovative "Grow-up, Grow-out" approach to engage students and school systems across the continuum of primary though secondary education, and beyond. A hallmark of the program is flexibility - activities can be delivered in the community or at the University's three campuses. Our activities include smaller class visits, large flagship events, summer programs, and teacher education with one of our partners (iXplore STEM). This has resulted in significant growth in the program's reach and impact over the past 5 years, with close to 5,000 students, teachers and parents being engaged this past academic year. Recent partnerships have focused on populations of students from disadvantaged backgrounds including the Biddeford school system and an afterschool and summer program (BLAST - Biddeford Learns After School Together). Centered on core neuroscience themes, scaffolded lesson plans are designed to be interactive, engaging and hands-on. Using the "Grow-up, Grow-out" approach, the curriculum increases in complexity as UNE undergraduate and graduate/professional students revisit students from early elementary through high school. Integrating other scientific fields into the lessons ("Grow-out") promotes transferrable learning, enabling students to apply neuroscience concepts to other areas of their education and matched with their passions and career aspirations. Preliminary outcome data indicate that the program is increasing accessibility and interest of neuroscience and STEM-related topics among K-12 students. The poster will also present some of the most critical lessons we have learned and approaches we have taken to grow and support the program, along with challenges we face as the program develops and matures.

Disclosures: E.J. Bilsky: None. **B. Potthoff:** None. **J. Malon:** None. **D. Landry:** None. **M. Dionne:** None. **J. Ray:** None. **I. Meng:** None. **M. Burman:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.17SU/OOO6

Topic: J.03. Public Awareness of Neuroscience

Support: National Science Foundation CAREER Award BCS1452530 (PI: Somerville)

National Science Foundation CAREER Award #1454518 (PI: Zaki)

Title: Sharing your science: A practical outreach workflow for researchers to promote responsible public engagement with neuroscience

Authors: *S. F. SASSE[1], M. BIALIK[2], J. ZAKI[3], A. WATSON[2], G. ABESAMIS[2], L. H. SOMERVILLE[1];
[1]Harvard Univ., Cambridge, MA; [2]Harvard Grad. Sch. of Educ., Cambridge, MA; [3]Stanford Univ., Palo Alto, CA

Abstract: A scientifically informed citizenry is critical to a healthy democracy. However, recent reports confirm a pervasive gap in the scientific knowledge, access to resources, and scientific literacy skills of the general public. This is particularly relevant to neuroscience, where findings are often misconstrued or misapplied towards real world decision-making and policy.
In recent years, the growing emphasis on "Broader Impact" statements and similar initiatives has catalyzed efforts to increase the dissemination and positive impact of research. However, despite this commitment to outreach, we have seen little improvement in formal measures of public engagement with or understanding of science. According to published reports, this may be due to the lack of centralization, standardization, and organization of outreach efforts.
The People's Science, a collaborative educational initiative, has worked to address this issue by synthesizing prior literature to design an outreach workflow that aligns with the needs of both researchers and the general public. The outreach workflow consists of three primary components: (i) science communication training, (ii) evaluation of publicly available resources, and (iii) production of lay summaries. By standardizing protocol and pooling established partnerships, the model encourages simple, clear, and unique contributions from researchers while leveraging liaisons to ensure maximal impact.
Peer-reviewed papers from across the fields of Public Understanding of Science, Neuro- and Psychological Sciences, and Science Communication were qualitatively reviewed and synthesized in the construction of a rubric, which characterizes the needs of a practical and impactful outreach workflow. A team of educators, researchers, and developers then collaborated to design a complementary set of curriculum and web platforms in accordance with this rubric. The result was then presented via focus groups and small group interviews to members of the public and active researchers. Interviewees responded to questions about their needs as well as

the usability, feasibility, and perceived value of the proposed model. The results of these interviews show that this three-part workflow is a valuable addition to the contemporary research cycle. As such, the core components are currently being developed into freely accessible web platforms for researchers to integrate into their outreach efforts.
Collectively, these efforts fill a critical gap by making it easy for researchers to play an informed and intentional role in improving the relationship between science and society.

Disclosures: **S.F. Sasse:** None. **M. Bialik:** None. **J. Zaki:** None. **A. Watson:** None. **G. Abesamis:** None. **L.H. Somerville:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.18SU/OOO7

Topic: J.03. Public Awareness of Neuroscience

Support: NSF award BCS 1533691

Title: Understanding brain aesthetic responses in natural complex settings: a citizen science approach

Authors: ***A. E. KOPTEVA**, J. G. CRUZ-GARZA, A. Y. PAEK, J. L. CONTRERAS-VIDAL; Electrical and Computer Engin., Univ. of Houston, Houston, TX

Abstract: Prior studies examined the neural basis of art perception in constrained and unnatural environments such as laboratories. However, people experience art in different contexts. For example, museums offer a curated space that allows individuals to think introspectively, view exhibits at various angles, and peruse at their own pace. As public places, museums are visited annually by thousands of patrons with rich demographics. With the advent of mobile brain-body imaging (MoBI) technology, it is now possible to acquire brain activity in action and context in public settings. Therefore, museums provide an opportunity to characterize the individuality and variability of neural activity in individuals using MoBI devices yielding more accurate representations of how the brain perceives art, while at the same time providing the ideal platform for community engagement in science (citizen science). Here, we report findings from our long-term study at the Blaffer Art Museum at the University of Houston, in which hundreds of participants used an integrated EEG-accelerometer headset spanning the frontal and temporal regions of the scalp, allowing wireless recording and visualization of the individual's brain activity, as they visited the exhibits. Participants' diverse demographics are shown in Figure 1.A.

and their self-identified preferences are shown in Figure 1.B. These preliminary results provide the basis on which to analyze brain activity patterns associated with aesthetic artistic stimuli.

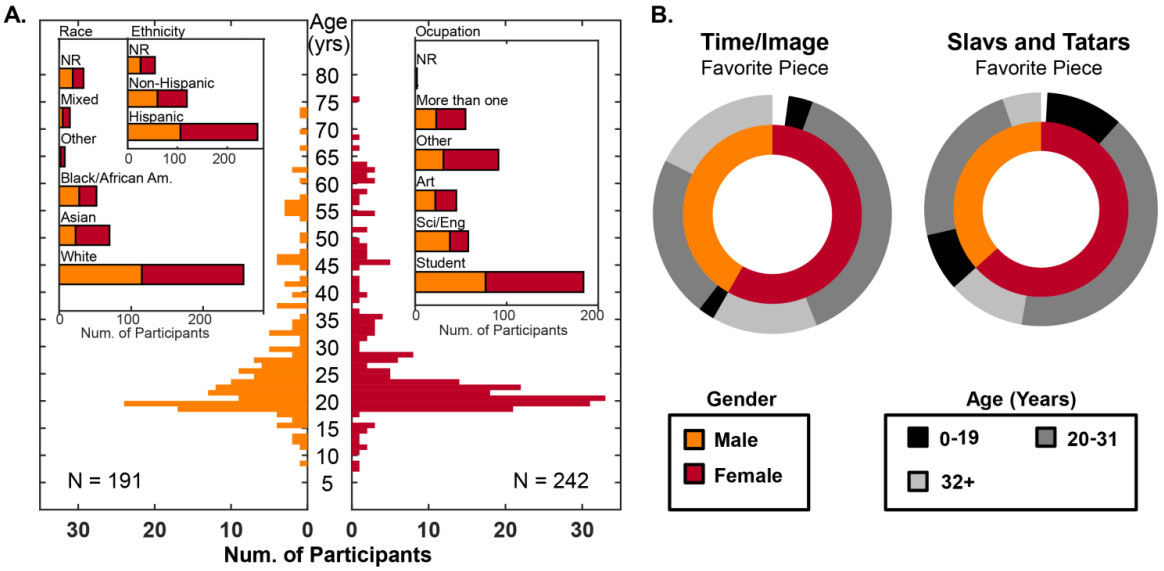


Figure 1: A. Demographic information for Time/Image exhibit (10/11/2015 - 12/12/2015) and Slavs and Tatars exhibit (01/20/2016 - 03/19/2016). **B.** Favorite piece as indicated by participants at Blaffer Art Museum in Houston during the Time/Image exhibit and in the Slavs and Tatars exhibit. The age groups are divided by the lower and upper quartiles.

Disclosures: A.E. Kopteva: None. **J.G. Cruz-Garza:** None. **A.Y. Paek:** None. **J.L. Contreras-Vidal:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 26.19SU/OOO8

Topic: J.03. Public Awareness of Neuroscience

Title: Neuro Transmissions - using YouTube to communicate neuroscience

Authors: *A. L. CALDWELL[1,2], M. J. R. CALDWELL, 92037[2];
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Abstract: Social media is a new and emerging avenue ideal for science communication across a broad variety of formats. In particular, streaming video services are extremely popular, with the

success of platforms such as Vine, YouTube, Periscope, and Facebook Live drawing millions of viewers engaging with content every day. To take advantage of this popular format, we have developed Neuro Transmissions, an educational YouTube channel dedicated to breaking down neuroscience for a broad audience. Through the use of concise, clear explanations and simple but accurate animations, we aim to engage the public on a variety of subjects. Since launching in September of 2015, we have amassed over 1,000 subscribers and have added Spanish subtitles and closed captioning to enhance the accessibility of our videos. Topics we have covered thus far include Neuro 101, highlighting concepts like "What is a Neuron?" and "How Do We See?" We have also covered pop culture topics linked to current events, like "The Science of Jedi Mind Control" during the release of Star Wars Episode VII. As the channel grows, we hope to expand our topics to cover neurological disorders, higher-level cognition, interviews with UCSD and Salk Institute faculty and students, and answering questions submitted by our viewers. Through these efforts, we hope to get members of the public interested in and excited about the brain, while highlighting the research efforts of UCSD and Salk Institute scientists.

Disclosures: **A.L. Caldwell:** E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Co-creator of Neuro Transmissions YouTube Channel. **M.J.R. Caldwell:** E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Co-creator of Neuro Transmissions YouTube Channel.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.01SU/OOO9

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Ethical considerations in head transplantation research

Authors: *J. A. CUOCO, G. W. KOUTSOURAS;
Biomed. Sci., New York Inst. of Technol. Col. of Osteop, Old Westbury, NY

Abstract: Nearly every organ of the human body is capable of being transplanted providing transient or permanent relief from a pathologic condition. Although organ transplantation can prolong life, the question arises as to whether it is ethical for any organ of the human body to be transplanted, especially that of the human head. Plans have recently been announced to perform the first human head transplantation procedure within the next few years (Canavero 2013; 2015). Furthermore, a head transplantation mouse model has recently been established (Ren 2015). The pace of the field makes it necessary to analyze and discuss the various ethical issues in using

animal models to study head transplantation. This poster will detail several questions and concerns pertaining to the ethics of studying head transplantation using animal models.
References:
Canavero S. HEAVEN: The head anastomosis venture Project outline for the first human head transplantation with spinal linkage (GEMINI). Surg Neurol Int. 2013;4:S335-S342.
Canavero S. The "Gemini" spinal cord fusion protocol: Reloaded. Surg Neurol Int. 2015;6:18.
Ren XP, et al. Head transplantation in mouse model. CNS Neurosci Ther. 2015;21:615-618.

Disclosures: J.A. Cuoco: None. **G.W. Koutsouras:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.02SU/OOO10

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: Ministry of Science & Technology, People Republic of China

Air Force Material Command, USAF, under grant number FA8655-05-1-3065

Society for Study on Neuroprotection & Neuroplasticity (SSNN) Cluj-Napoca, Romania

Title: More research and education is needed to expand our knowledge on the neurotoxicity of nanomaterials for therapeutic strategies in CNS diseases

Authors: *L. FENG[1], A. SHARMA[2], D. F. MURESANU[3], A. NOZARI[4], A. OZKIZILCIK[5], R. TIAN[6], H. S. SHARMA[2];
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Abstract: Nanodelivery of drugs, diagnostic agents and other functionalized nanoparticles aiming for better treatment of diseases or diagnosis purposes are the new trends in medicine that appear promising. However, nanoparticles or nanotechnology used to deliver these agents in vivo may have potential risks for cell and tissue damages. Thus, before nanotechnology is widely accepted as a routine therapeutic tool for effective medical treatment or for diagnostic tools this is mandatory to study their potential or plausible neurotoxic effects in details. So far effects of nanoparticles or nanomaterials including biodegradable nanoparticles on toxicity in the central

nervous system (CNS) is not very well documented in the literature. Also, there is an urgent need to find dose related studies on nanoparticles on cellular toxicity especially in vivo situations. Without these details and systematic studies, the use of nanomedicine still remains questionable. There are also reports that drugs delivered through different kinds of nanoparticles, nanowires or poly-lactic-*co*-glycolic acid (PLGA) nanoparticles even in identical doses have slightly but significantly different effects on cellular protection when administered in vivo situations. This suggests that drug effects could vary depending on the use of specific nanocarriers. In our hands, drugs i.e., cerebrolysin, DL-3-n-butylphthalide (DL-**NBP**) or H-290/51 tagged with TiO2 nanowires or titanate nanospheres have superior neuroprotective effects in CNS injury than their delivered through PLGA-nanoparticles in identical manner. Although, TiO2 by itself has no cellular toxicity effects within 48 h of its administration, data on other nanoparticles on neurotoxicity in vivo is still lacking.
We feel that our policy makers, researchers, clinicians and nanotechnologists should consider exploring the dose response relationship of nanoparticles from wide variety of nanocarriers on cellular toxicity in both vivo and in vitro situation urgently. These studies will help create a database for suitable nanocarriers to use for drug delivery to the CNS as effective therapeutic tools in clinics. Only after these data nanoneuropharmacology is developed as a distinct discipline in future. Thus, it would also be necessary to see whether same nanocarriers could be good for all different types of drugs to induce better or superior effects than their parent compounds in a given neurological disorder in model experiments.

Disclosures: **L. Feng:** None. **A. Sharma:** None. **D.F. Muresanu:** None. **A. Nozari:** None. **A. Ozkizilcik:** None. **R. Tian:** None. **H.S. Sharma:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.03SU/OOO11

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Elon BrainCARE: Concussion knowledge and education for faculty and staff in a university setting

Authors: *C. J. KETCHAM[1], M. GRIFFIN[1], K. PATEL[2], E. E. HALL[1];
[1]Exercise Sci., [2]Sports Med., Elon Univ., Elon, NC

Abstract: Concussion awareness is part of the landscape of any college campus. A concussion during the academic year whether due to a sport injury or other accident can impact the academic performance of college students. Faculty and staff on campus are often asked to make

accommodations due to injury, but it is not clear if they understand the symptoms and recovery of a concussion and what are appropriate expectations of students in their classroom. This work is around an assessment of concussion knowledge in which 208 faculty and staff completed a survey. In general, respondents have some knowledge of concussions but have misunderstandings about how long it takes to recover, what accommodations are appropriate, and what the long-term impact of a concussion may involve. Elon BrainCARE is a research and education entity and after assessing knowledge sent targeted education to faculty and staff. Because concussions are a hot topic in the news, many are unclear on how to help manage a student with a concussion in their classroom, but want to support the student appropriately. Information on facts around recovery and return-to-learn can greatly empower educators to help students make reasonable accommodations and seek additional knowledge if questions arise. The goal of this work is to provide a framework and viable protocol for college campuses to implement on their campuses around concussion management, recovery and return-to-learn.

Disclosures: **C.J. Ketcham:** None. **M. Griffin:** None. **K. Patel:** None. **E.E. Hall:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.04SU/OOO12

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Elon BrainCARE: concussion knowledge, attitudes and education for varsity and club student-athletes

Authors: *E. E. HALL[1], N. DENNION[1], K. PATEL[2], C. J. KETCHAM[1];
[1]Exercise Sci., [2]Sports Med., Elon Universtiy, Elon, NC

Abstract: It is estimated that about 50% of the concussions in student-athletes are not disclosed. This leads to many suggesting that we need to do a better job educating student-athletes about concussions. As part of many different state policies, student-athletes are supposed to be educated about signs and symptoms related to concussions and other aspects of concussion. Additionally, the NCAA has mandated that all student-athletes, coaches, administrators and sports medicine personnel be educated about concussions. However, the effectiveness of this mandate has been questioned. Elon BrainCARE is a research and education entity surrounding concussions in student-athletes. We were interested in trying to determine what student-athletes know about concussions and what their attitudes are surrounding concussions. To determine this, the Rosenbaum Concussion Knowledge and Attitudes Survey (RoCKAS) was administered to 239 varsity (n = 122 female) and 298 club (n = 150 female) collegiate student-athletes. There

were no differences in concussion knowledge between club and varsity athletes or between males and females. The average score was 20.7 out of 25 on the concussion knowledge scale which suggests that collegiate student-athletes are fairly knowledgeable about concussions (approximately 83% correct). However, when examining the attitudes of student-athletes it was found that females had a slightly safer attitudes towards concussions then males (45.0 compared to 43.9). There were no differences between club and varsity. It should be noted that this scale was out of 75 suggesting that there is a lot of room to improve the attitudes about concussions compared to concussion knowledge. Future interventions may be more effective by attempting to change attitudes about concussions as opposed to increasing concussion knowledge. The goal of this work is to provide a framework and viable protocol on possible ways to continue education surrounding concussions, but also focus on potential ways to change attitudes to provide a supportive environment for concussion disclosure.

Disclosures: **E.E. Hall:** None. **N. Dennion:** None. **K. Patel:** None. **C.J. Ketcham:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.05SU/OOO13

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: An exploration of the scientific legislation process

Authors: *A. M. DETTMER;
Lab. of Comparative Ethology, Natl. Inst. of Child Hlth. and Human Develop., Poolesville, MD

Abstract: As a 2016 Society for Neuroscience Early Career Policy Ambassador, I conducted interviews with several stakeholders in the science legislation process to learn about the steps to creating and enacting legislation, the particular actions that each stakeholder takes in the process, and the specific steps along the way that scientists can become effectively involved in the process. I interviewed the National Association for Biomedical Research (a science advocacy group), my Congressional representative, and a Legislation/Public Policy Director at the NIH. I asked questions about 1) each stakeholder's role in the legislative process, 2) examples of pro-science legislation that each has worked on, 3) the process of keeping legislators informed of scientific findings, and 4) particular ways that scientists (and the general citizenry) can become effectively involved in the process. The main findings were that 1) the legislative process is a circuitous one with many possible points to "kill" pro-science legislation, 2) legislators highly value constituents' personal contact, 3) scientists must communicate their work and their "asks" with laser-like focus, and 4) the grassroots level (e.g., phone calls, office visits) is the most

effective path for scientists to become effectively involved in the process. This conglomeration of information will be depicted in a schematic diagram on this poster.

Disclosures: A.M. Dettmer: None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.06SU/OOO14

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: society for Study on Neuroprotection and Neuroplasticity (SSNN) Cluj-Napoca, Romania

Swedish Medical Research Council Grant nr 2710

Air Force Office of Scientific Research (EOARD, London, UK),

Title: Need to educate researchers, clinicians and policy makers about nanodelivery of drugs in neuroscience for effective management of clinical strategies in healthcare

Authors: *D. F. MURESANU[1,2], A. SHARMA[3], A. OZKIZILCIK[4], R. TIAN[5], H. S. SHARMA[3];
[1]THE FOUNDATION OF THE SOCIETY FOR THE STUDY OF NEU, CLUJ NAPOCA, Romania; [2]Neurol., ‘‘RoNeuro’’ Inst. for Neurolog. Res. and Diagnostic,, Cluj-Napoca, Romania; [3]Surgical Sciences, Anesthesiol. & Intensive Care Med., Uppsala Univ. Hosp., Uppsala, Sweden; [4]Biomed. Engin., [5]Chem. & Biochem., Univ. of Arkansas, Fayetteville, AR

Abstract: Of all disease inflicting our human populations in the World, neurological disorders occupy top positions for disability, work loss and death of affected persons as compared to any other diseases of the organs. A rough estimate suggests that out of all types of neurological diseases cerebrovascular diseases (CVD) occupy 55 % of the total slot of neurological diseases followed by Alzheimer’s disease and related dementia (AD) 12% and migraine and epilepsy by 8 % each. Thus, taking care of neurological disorders is the prime concern of clinicians to make our World healthy and prosperous and peaceful. A healthy mind will also keep healthy body and this would result in social harmony and care to the World populations.
However, any neurological disorder that inflict any individual will not result due to one error or factor that could be corrected by one type of the drug. In fact several hundreds or even thousands of factors are involved leading to any neurological diseases be it CVD, AD or common headache other related ailments. It appears that chronic disturbances in the central nervous system (CNS)

for long time will result in alterations in cellular and molecular machinery causing DNA damage resulting in cancerous cells and enhancing brain tumor. Thus one of the principle aims of clinicians is to treat CNS diseases using multimodal drugs that could be capable of delivering several right kinds of factors to the inured or degenerated brain in order to enhance neuroregeneration and neuroplasticity. The era of single drug treatment for one disease is over now.
Thus, we need effective multimodal drugs and their quick and long-lasting penetration into the CNS for en effective treatment. One example of a multimodal drug that is a well balanced composition of several neurotrophic actors and active peptide fragments is Cerebrolysin that treats neurological disorders e.g., stroke, AD, CVD and traumatic brain injuries quite effectively if given in a reasonable interval after the primary insult. However, when the neurological diseases are complex such as AD, our experimental data have shown that in such situations nanodelivery of cerebrolysin is more superior in preventing brain damage than the parent compound by itself alone. Thus, the need of the hour is to explore nanodelivery of drugs like cerebrolysin and others to provide a cost-effective and suitable treatment of CNS diseases. To deliver drugs using nanotechnology we need the help of not only clinicians but also a clear policy by the lawmakers, food & drug administration (FDA) and other local authority to have clear guidelines about the use of nanotechnology for the treatment of neurological diseases in the near future.

Disclosures: D.F. Muresanu: None. **A. Sharma:** None. **A. Ozkizilcik:** None. **R. Tian:** None. **H.S. Sharma:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.07SU/OOO15

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: The importance of student advocacy at the science-policy intersect: my journey as an early career neuroscientist

Authors: *N. CHARALAMBAKIS, W. GUIDO;
Anatom. Sci. & Neurobio., Univ. of Louisville, Louisville, KY

Abstract: I started graduate school with the ambition to make a difference in neuroscience. Research was rapidly progressing and techniques were advancing. But the more my research developed, the clearer it became just how important federal funding was. Without it, my lab is unable to thrive. For years, the NIH/NSF budget has been underfunded. While the $2 billion

increase for NIH in FY16 is a remarkable step forward, in real dollars the NIH budget remains 20% below 2003 levels. That's when I understood the power of advocacy, and the importance of making my voice heard. With this realization, I co-founded the first student organization at my university that aims to make students, faculty, and general public aware of the policy issues driving the work we do on a daily basis. Recently, our group partnered with the Louisville Regional Science and Engineering Fair (LRSEF) organization and planned a Middle School/High School Advocacy Day. Winners of the science fair joined us for a visit to the state capital to speak with state legislators about his/her project. Students also had the opportunity to meet with the newly-elected Governor. Watching the students' faces light up as they spoke about why the science fair is important to them reinforces my belief that exposing the young generation to advocacy early on will narrow the gap in communication between scientists and policymakers. As an SfN ambassador, I plan on organizing additional advocacy activities in my community. Advocacy begins with education, and this is my main area of focus. By creating a resource toolkit, students will learn how to deliver an effective "elevator speech" and precisely what steps he/she can take to advocate at the local and national level. In this way, this resource will emphasize the overarching message that biomedical research benefits all parties, all aspects of life. As scientists and public servants, it is our duty to step up and make this a talking point of conversation. I will also host an advocacy/policy workshop at my university campus. So often I interact with fellow students and postdocs and notice the lack of understanding in how the federal budget process operates. By educating students on this step-by-step procedure will help them understand Congress's powerful role in shaping R&D policy. More importantly, students will recognize the influence our scientific input holds at every stage of this decision-making process. I am energized and excited to serve as SfN ambassador. My hope is to rejuvenate the conversation surrounding science and policy, and encourage all young scientists to harness his/her strengths, and use them in ways that will propel biomedical research forward.

Disclosures: N. Charalambakis: None. **W. Guido:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.08SU/OOO16

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Systems or symbiosis, engineers only? ethical appraisal at the intersection of neuro-systems convergence

Authors: *D. C. LARRIVEE[1], A. LARRIVEE[2];
[1]Toronto, CANADA, Intl. Assn. Catholic Bioethicists, Williamston, SC; [2]Catholic Univ. of America, Washington, DC, DC

Abstract: This poster considers ethical ramifications of the growing trend in neuroengineering toward multifactorial augmentation of human functionalities. Institute of Electrical and Electronics Engineers (IEEE) IEEE-Brain and IEEE-Systems, Mind and Cybernetics Society will convene their 6th workshop on brain-machine interfacing in Budapest this October. The society's flagship annual conference will center their workshop theme on New Research Opportunities and Industrial Applications in BMI Systems Arising from the IEEE Brain initiative that involve the integration of human-machine systems and cybernetics. The intimate yoking of human and machine functionalities is not merely an engineering quandary with its requisite need for design skills (Tewfik, 2016), however, but poses questions at levels of ethics, philosophy of science, epistemology, and law, expertise which must be secured prior to implementation of design. Systems are typically distinguished by closed operational configurations and by integrated/coordinated control. Functionalities acquired through neuroaugmentation are thus subsumed within the human/brain's operational configuration and hierarchical oversight. Computational devices based on neuromorphic architecture, for example, are multi-level, and the point of insertion of machine processing multifactorially determined. In the sorts of closed loop processes that constitute such systems, multi-level insertion poses a problem of hierarchy of control over lower level processes, and so raises ethical issues regarding the potential for infringement of human autonomy. Proposed human augmentation, moreover, is typically structured within large scale systems, where engineering open loop designs create symbiotic associations between individuals and the larger systemic entities; for example, social information and communications technologies (ICTs) that now assume global dimensions. Ethical issues regarding the potential for infringement of human autonomy are considered in both neuroaugmentation cases.
Ferscha A, Farrahi K Van den Hoven J, Hales D, Nowak A, Lukowicz P, and Helbing D (2012) Socio-inspirt ICT. European Phys J 214:401-434. Tewfik A (2015). The role of information acquisition in human intelligence amplification. http://vancouver.ieee.ca/content/role-information-acquisition-human-intelligence-amplification.

Disclosures: D.C. Larrivee: None. **A. Larrivee:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.09SU/OOO17

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: Air Force Material Command, USAF, under grant number FA8655-05-1-3065

Swedish Medical Research Council Grant nr 2710

Title: Researchers should be educated to use disease model of experiments for drug testing to simulate real life situations for clinical strategies in neuroscience

Authors: *R. PATNAIK[1], A. SHARMA[2], D. F. MURESANU[3], A. NOZARI[4], H. S. SHARMA[2];
[1]Indian Inst. of Technology,Banaras Hindu Univ., Varanasi, India; [2]Surgical Sciences, Anesthesiol. & Intensive Care Med., Uppsala Univ. Hosp., Uppsala, Sweden; [3]Clin. Neurosciences, Univ. of Med. & Pharm., Cluj-Napoca, Romania; [4]Anesthesiol. & Critical Care Ctr., Massachusetts Gen. Hospital, Harvard Med. Sch., Boston, MA

Abstract: Although research on neuroprotective agents to treat neurodegenerative, traumatic or ischemic injuries resulted in several new drug-discovery in the past, several lacunae still exist in the whole process. Accordingly, many therapeutic agents that are very effective in animal models fail to achieve any success in clinical trials. In spite of this arduous failure of drug trials, basic research continues to thrive with little success at the clinical front. One of the main reasons of this failure is due to our faulty experimental design. Thus, this is high time to reconsider our approach towards basic research aimed for exploring therapeutic agents for clinical practices. Majority of research on animals is carried out in rodents that are nocturnal in habit. But all experimental procedures are performed during daytime in the laboratory. Obviously, this will affect the results tremendously. Moreover, we test our drugs for stroke, traumatic injuries, Alzheimer's disease or any other CNS insults in healthy animals only using model experiments. However, this is not the case commonly seen in patients. Normally, patients having stroke are suffering from other co-morbidity factors e.g., diabetes and/or hypertension as well. However, we perform stroke model in healthy animals by restricting blood supply to the brain. Also neurotrauma research is conducted in healthy animals only for exploring possible drug therapy. On the other hand, patients or military personnel when they get injured in the battle field are exposed to so many other external factors e.g., nanoparticles, fine particles pollutions, sand, and fumes from explosion. Obviously, under these circumstances their pathophysiology of CNS injury could be entirely different and they require special drug treatment for these purposes. Thus, data should be collected in animals after CNS injury to simulate these real life conditions. Also, most of the times we use one type of drug to teat CSN injury or neurodegeneration. However, neurotrauma or neurodegeneration leads to changes in several hundreds of parameters that could not be corrected with one drug type. Thus, we need multimodal drugs and their effective delivery to treat CNS insults otherwise clinical trials based on these data are bound to fail.

Disclosures: **R. Patnaik:** None. **A. Sharma:** None. **D.F. Muresanu:** None. **A. Nozari:** None. **H.S. Sharma:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.10SU/OOO18

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Computation without comprehension: how neuroscientists have projected a false impression of engineering expertise

Authors: *I. R. NIZAMI;
Independent Res. Scholar, Palo Alto, CA

Abstract: Claude Shannon was born 100 years ago. His 1948 invention of Information Theory was greeted with acclaim. It provided a long-awaited engineering computation, Information Transmitted, which was also rapidly adopted in Neuroscience. But there were hidden ethical issues (see present author, *IEEE 2014 Conference on Norbert Wiener in the 21st Century*), issues rarely recognized or discussed. One particular issue, not yet aired, relates to professional credibility, as follows. The literature shows that any given neuroscientist tended to publish Information Transmitted computations only once. However, said papers' various authors typically claimed that Information Transmitted had been highly revelatory. Why, then, abandon it? No-one explained. Perhaps the authors lost faith in the method, due to their own incomprehension. This interpretation is plausible, for the following reasons. The literature shows that neuroscientists habitually computed Information Transmitted using borrowed software, despite claiming that the needed math was obtained first-hand from Information Theory papers and/or books. Of such documents, the books are by far the most authoritative; more than 20 dedicated monographs exist. Yet, extraordinarily, the vast majority of the relevant neuroscience papers of the last 25 years seem to cite *just one text*: Cover & Thomas (1991). Mysteriously, earlier texts had become redundant. To demystify this conundrum, the present author scrutinized the first 1,000 of 38,000 GoogleScholar citations of Cover & Thomas (1991). The vast majority concerned communications engineering. Indeed, Cover & Thomas *never mentioned* the life sciences. And neuroscientists citing Cover & Thomas *never mention* any specific page number, equation, passage, or concept from that book. In short, neuroscientists had no *a priori* reason to read Cover & Thomas (1991), and indeed, they had apparently not read it at all. Altogether, then, neuroscientists have projected a false impression of engineering expertise. Ironically, there is a book solely dedicated to applying Information Theory to neurons, namely, *Spikes: Exploring the Neural Code* (Rieke et al., 1997). Neuroscientists have cited it more than 2,500 times. But it is top-heavy with math, like Cover & Thomas (1991); and there is no evidence that the citers understood any of such math, or indeed, that they had ever read *Spikes*. In sum: neuroscientists have offered a misleading impression of Information Theory expertise, by citing algebraically-

complicated books that they are unlikely to have read. In fact, they had relied upon borrowed software. All of this is poor practice, and readers of neuroscience papers need to be warned.

Disclosures: I.R. Nizami: None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.11SU/OOO19

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: The LASA - BAP - BNA - ESSWAP guiding principles in behavioural laboratory animal science

Authors: *C. STANFORD;
UCL, London, United Kingdom

Abstract: These Guiding Principles in Laboratory Behavioural Animal Science were produced by the Laboratory Animal Science Association (LASA) in collaboration with three other European learned societies (British Association for Psychopharmacology, British Neuroscience Association & ESSWAP Foundation). The document can be downloaded from the websites of all these organisations (e.g., www.lasa.co.uk). Their aim is to help researchers make informed decisions about how best to carry out studies of animal behaviour. New recruits to behavioural laboratory animal science are the intended target readers, but anyone with an interest in this field should find them useful: including lay members of panels that deal with animal welfare and ethical review. The topics concentrate on laboratory-based research but some also apply to ethological studies in the natural environment. Although there is an understandable bias towards neurological and neuropharmacological studies of animals, many points are relevant to all biomedical experiments. Obviously, it would be impossible to cover individual procedures because so many are used, in different experimental contexts, to study a wide range of species at various stages of development. Instead, the Guidelines highlight principles that apply to all species but, when necessary, they discuss work with rats and mice because they are used most often in laboratory animal science. Each section of the Guidelines includes questions that stimulate thoughts on how best to approach and carry out the experiments. This appraisal process will help researchers make objective decisions on matters such as: justifying the choice of procedure; opportunities for optimising animal welfare; implementation of the 3Rs; and key ethical questions. It will also help to ensure that researchers optimise their experimental design and avoid common pitfalls when interpreting the results. All the points included in the Guidelines were flagged as fundamental at a workshop, held in London (UK), attended by more

than fifty international experts, who represented all aspects of behavioural laboratory animal science: breeders, veterinary surgeons, animal technicians, statisticians, regulators, animal welfare charities, industry, biotechnology centres, contract research organisations and universities. These Guidelines assimilated the contributions from them all.

Disclosures: C. Stanford: A. Employment/Salary (full or part-time): University College London.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.12SU/OOO20

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: AARP

Title: Recommendations by Global Council on Brain Health for promoting brain wellness and healthy aging

Authors: *L. R. CHURA, S. L. LOCK;
Office of Policy, Research, and Intl., AARP, Washington, DC

Abstract: Our global society is undergoing an unprecedented demographic shift with the aging population now comprising the fastest growing demographic. As people live longer, the need for clear, trustworthy information on brain health based on the most up-to-date neuroscience findings is greater than ever. The Global Council on Brain Health was launched in October 2015 by AARP, in collaboration with Age UK, and aims to provide the scientific foundation for policy recommendations to improve public health. The Council is an independent collaborative of scientists, physicians, scholars and policy experts convened to provide the foremost thinking on what people and professionals can do to maintain and improve brain health. A core group of thirteen experts from around the world comprise “the hub” or governance committee. This group oversees issue-matter experts -“the spokes”- in examining lifestyle priority areas, including: physical exercise, mental engagement, diet, sleep, stress levels, socialization, medications, and supplements. Surveys have been conducted to ascertain ways in which the Council can engage with the public to promote brain health and provide information on topics of most interest. Beginning in July 2016, the Council will issue reviews and recommendations for the general public that will focus on risk reduction as a way of promoting and maintaining brain health. To this end, the Council will put forward recommendations accompanied by practical strategies. This presentation will therefore provide an integrative framework for understanding how

advancements in neuroscience can be translated into actionable recommendations that promote brain wellness and healthy aging.

Disclosures: **L.R. Chura:** None. **S.L. Lock:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.13SU/OOO21

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: SfN Early Career Policy Ambassadors Program

Title: Fighting for our futures: An effort to increase early career scientists' involvement in science advocacy

Authors: ***S. S. PISTORIUS**, J. D. OBRAY, S. C. STEFFENSEN;
Neurosci., Brigham Young Univ., Provo, UT

Abstract: In 2015, the number of applications for research project grants to the National Institutes of Health (NIH) reached an all-time high while the number of awards available remained mostly unchanged. This has resulted in a decreasing success rate for applications submitted. One reason for this trend is decreased appropriations to the NIH from Congress. When taking rates of inflation into account, NIH funding has continually decreased since 2003. This results in fewer grants, fewer new discoveries, and more talented scientists leaving research because low appropriations to the NIH most strongly impact early career scientists who rely on the NIH to support their research ambitions. In an effort to address these issues, Early Career Policy Ambassadors and other members of the Society for Neuroscience (SfN) met with members of congress during SfN's Capitol Hill Day. There, we asked for appropriations of at least $34.5 billion to the NIH for the 2017 fiscal year. While it is believed that biomedical research is one of the last remaining bipartisan issues, finding increased support for the NIH on the Hill was not easy. Capitol Hill Day made apparent how important it is for scientists to become more involved in science advocacy, especially early career scientists whose future is greatly dependent on Congress's continual support of the NIH. As such, we have organized training events where scientists, particularly early career scientists, in the state of Utah can learn more about how to get involved in science advocacy. It is important for elected representatives to hear directly from scientists and to see for themselves how funding for the NIH is used. Inviting local and state elected representatives to visit research laboratories is one way we can help politicians recognize the importance of biomedical research. In addition, remaining in contact

with our legislators is key in encouraging long-term support for the NIH. By increasing the involvement of early career scientists in science advocacy, we can be sure that legislators will gain greater insight into the importance of scientific research.

Disclosures: **S.S. Pistorius:** None. **J.D. Obray:** None. **S.C. Steffensen:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.14SU/OOO22

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: NIH Grant R25 NS076414

Title: Mentoring institute for neuroscience diversity scholars (minds)

Authors: M. ZIGMOND[1], B. FISCHER[1], T. BAUST[1], *G. E. TORRES[2];
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Abstract: Despite years of discussion, research, and efforts to promote change, a great disparity remains between the presence of black, Hispanic, Native American, and other underrepresented minority (URM) faculty at US research universities and their representation in the US population. Moreover, URMs who do achieve faculty status appear to achieve traditional measures of success at a lower rate than do their majority counterparts. There is a striking absence of URMs in visible positions of prominence, such as full professors or chairs at research universities and as symposia speakers, editors, or societal officers. We believe that these two problems are related, that if those URMs who are faculty become more successful in regard to those measures, this will stimulate an influx of other URMs into faculty ranks. Our evaluation of available programs in the United States strongly indicates that there are limited opportunities to adequately assist early career URM faculty in overcoming these difficulties, and it is this problem that we seek to address through the establishment of MINDS. Defining success for such faculty in terms of quality and quantity of manuscripts published and research grant proposals submitted, scored, and funded, we have established MINDS based on the following hypothesis: The success of early career URM faculty members can be increased substantially by an intensive individualized educational program focused on (1) exposure to cutting edge research in basic neuroscience, (2) increased background on the neurobiology of disease, (3) instruction in professional skills and the responsible conduct of research (RCR), (4) development of an expanded network, and (5) frequent mentoring by established faculty. We currently identify 8-10

URM junior faculty members or senior postdoctoral fellows who are involved in neuroscience research and demonstrate great promise for success. We then develop individualized career development programs for each participant selected and together the participant and mentoring team will develop a career development plan. To facilitate that plan we establish a one- year educational program consisting of (a) workshops, (b) mentored attendance at professional scientific meetings, (c) assistance in the expansion of their network, and (d) a listserv to promote communication among the participants. The impact of our efforts is being carefully evaluated and the results disseminated at meetings and in published articles. We believe that this approach will have a significant impact on the success of early career URM faculty in the neurosciences and will also serve as a model for programs in many other areas of academia.

Disclosures: **M. Zigmond:** None. **B. Fischer:** None. **T. Baust:** None. **G.E. Torres:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.15SU/OOO23

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: Univ. of KY Office of the Vice President for Research

Title: Implementation of GLP-inspired good research practices in academia to support transparency, rigor and reproducibility

Authors: *O. M. LITTRELL[1,2], R. C. GRONDIN[1,2], G. A. GERHARDT[1,2], D. M. GASH[1,2]; [1]Dept. of Anat. & Neurobio., Univ. Kentucky, Lexington, KY; [2]GLP Neurosci. Center; Good Res. Practice Resource Ctr., Univ. of Kentucky, Lexington, KY

Abstract: Public opinion of scientific research has declined due to increasing evidence for lack of reproducibility and headlines highlighting poor scientific practices[1]. Better efforts to safeguard data quality are needed to reestablish confidence in research. Efforts to improve data quality and reproducibility are being implemented by federal funding agencies (NIH, for example) and leading journals, which include expectations of greater transparency in study design, conduct and reporting[2-5]. We have utilized our experience meeting federal requirements (Good Laboratory Practices, GLPs) to serve as a resource to address research standard requirements that promote data quality, integrity, and reproducibility.
The University of Kentucky Vice President for Research supported and tasked our group to develop a model for Good Research Practice (GRP) standards - inspired by elements of GLPs and adapted to address key areas outlined in new funding application and journal requirements.

Our working model includes: transparent documentation, study conduct (study plan/protocol inclusive of rigorous experimental design, scientific premise, consideration of relevant biological variables, authentication of key biological/chemical reagents, and SOPs), equipment standardization, personnel training, and record retention. We recently launched a series of introductory presentations and forums to begin a dialogue between the GRP Resource Center and the university research community, including the colleges of Agriculture, Pharmacy and Medicine, regarding the proposed refinement of non-regulated research standards and best strategies to address new standards. Feedback was obtained via survey. Results indicate researchers were most interested in improving reporting processes (45% indicating interest) and documentation and record retention policies (41% indicating interest). Overall, feedback to date suggests that the university research community views the implementation of quality systems favorably.

[1]Freedman, L. P., Cockburn, I. M. & Simcoe, T. S. The Economics of Reproducibility in Preclinical Research. PLoS biology 13, e1002165, doi:10.1371/journal.pbio.1002165 (2015).[2]Collins, F. S. & Tabak, L. A. Policy: NIH plans to enhance reproducibility. Nature 505, 612-613 (2014).[3]Landis, S. C. et al. A call for transparent reporting to optimize the predictive value of preclinical research. Nature 490, 187-191, doi:10.1038/nature11556 (2012).[4]Editorial. Journals unite for reproducibility. Nature 515, 7, doi:10.1038/515007a (2014).[5] McNutt, M. Journals unite for reproducibility. Science 346, 679, doi: 10.1126/science.aaa1724 (2014).

Disclosures: O.M. Littrell: None. **R.C. Grondin:** None. **G.A. Gerhardt:** None. **D.M. Gash:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.16SU/OOO24

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: Rigor and reproducibility in neuroscience: Six Sigma and its implications on the training of future neuroscientists

Authors: *L. R. MILLER[1,2], C. E. BROOKS[1,2], A. C. MISTRETTA[1,2], J. L. PLANK-BAZINET[1,2], T. L. CORNELISON[1,2];
[1]Office of Res. on Women's Hlth., [2]NIH, Bethesda, MD

Abstract: The rigor of scientific research studies has been scrutinized in recent years. The National Institutes of Health (NIH) has announced plans to implement new policies to help enhance the rigor and reproducibility of biomedical research studies. As of fiscal year 2017,

training grants, institutional career development awards and individual fellowships will be required to provide a summary of instruction planned for pre-doctoral and post-doctoral trainees in institutional training grant applications and for scholars in institutional career development applications. In addition, individual fellowship applications must ensure rigorous, well-controlled experiments in their research strategy. Here we propose that the Lean Six Sigma techniques may be applied to instruction on precision and transparency to enhance neuroscience research training and career development. This poster will provide the case for the application of Lean Six Sigma techniques in development of substantive and effective instructional plans and curricula to ensure neuroscience trainees, scholars and fellows receive the knowledge and skills to design and conduct rigorous experiments.

Disclosures: **L.R. Miller:** None. **C.E. Brooks:** None. **A.C. Mistretta:** None. **J.L. Plank-Bazinet:** None. **T.L. Cornelison:** None.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.17SU/OOO25

Topic: J.04. Ethical and Policy Issues in Neuroscience

Support: SfN Early Career Policy Ambassador Program

Title: How and why to advocate for science at the state and local level

Authors: *D. E. O'BRIEN;
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Abstract: As a SfN Early Career Policy Ambassador, my aim is to utilize my knowledge and experience in advocacy gained during SfN Hill Day 2016 in order to both effectively advocate for science in my current state of Tennessee and impart the importance of such work to my collegues and non-scientists. As a science advocate in Tennessee, I am planning to partner with local mental health advocates in order to discuss necessary mental health reforms with state legislators. To advocate to the general public, I am giving talks to societies of professionals focusing on the new frontiers of neuroscience and technological advances emanating from science funding. Using professional societies as a means to reach a broader, more representative population, I am actively advocating for science to people who are less informed about advances in science specifically in neuroscience. To encourage young scientists to participate in science advocacy, I am speaking to them about the importance of science advocacy regardless of their career trajectory providing concrete examples of how they can perform science advocacy in their

lives. In concert with this, I am developing a downloadable webinar wherein a diverse group of career scientists discuss how they have been involved in science advocacy throughout their careers. Thus, through these distinct advocacy activities, I am reaching out to state representatives, the general public, and scientist themselves in order to advocate for science broadly and to groups that otherwise are overlooked by the science advocacy community.

Disclosures: D.E. O'Brien: C. Other Research Support (receipt of drugs, supplies, equipment or other in-kind support); AstraZeneca.

Theme J Poster

027. Ethical and Policy Issues in Neuroscience

Location: Halls B-H

Time: Sunday, November 13, 2016, 8:00 AM - 12:00 PM

Program#/Poster#: 27.18SU/OOO26

Topic: J.04. Ethical and Policy Issues in Neuroscience

Title: How should we regulate pervasive neurotechnology?

Authors: *M. IENCA, F. JOTTERAND, B. ELGER;
Biomed. Ethics, Univ. of Basel, Basel, Switzerland

Abstract: Pervasive neurotechnology (PN) applications are increasingly used outside the clinical and research setting as everyday technologies for healthy people to track, monitor or modulate brain activity, facilitate cognitive training, enhance experience in entertainment and enable direct brain-control of digital applications. PNs include non-invasive neurostimulators −mostly based on transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS), brain-computer interfaces (BCIs) for real-time neuromonitoring or device control, and virtual reality (VR) headsets. In the past 10 years the number of patent classifications related to PN has more than doubled. Currently, there are over 8k PN active patents and just as many pending applications.
While the market of commercial PN applications is rapidly growing, it is questionable if our current regulatory frameworks and ethical safeguards are ready to face this expansion. In fact, most PNs are not FDA certified nor subject to the FDA guidelines for *mobile medical applications.* In addition, since most PN devices are produced by non-HIPAA covered entities, the data they collect are not protected by HIPAA. This defective legal coverage has two major implications: (i) commercial PN devices can track and collect medical information from users and even modulate the users' brain activity without being subject to the same safety and security standards of medical devices; (ii) the data collected by PN devices, including medical and personally identifiable data of users, are exclusively regulated by the (rarely ever read) product terms & conditions and can be re-used for commercial purposes without the user's explicit

consent. This is relevant because the growing commercial diffusion of PN will produce an enormous increase in the quantity and quality of raw brain data available for analysis.
In this contribution, we delineate the critical ethical and regulatory issues associated with the commercial use of PN. Four main issues are identified: (I) safety, (II) security, (III) privacy, (IV) data ownership, (V) and informed consent. Based on our normative analysis we call for an evidenced-based approach to the safety, security and data protection risks associated with the growing availability of commercial PN applications. In addition, we call for enforceable policies to protect the users' ownership over their data and prevent unconsented use, sharing or selling of those data. This contribution is aimed at proactively adapting our current regulatory framework to the novelty of PN in a manner that supports technological innovation in PN while minimizing the unintended risks for individual users.

Disclosures: **M. Ienca:** None. **F. Jotterand:** None. **B. Elger:** None.