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Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.01SA/CC14

Topic: J.01. History of Neuroscience

Title: Building a philosophical framework for the neuroscience of emotions

Author: *H. STORL;
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Abstract: Recent findings in the social neurosciences have shown that successful social interaction requires at least two necessary components: a theory of mind and a capacity for social emotion. While the neurological basis of these two distinct components has begun to emerge, their philosophical nature remains befuddling. In part, the philosophical difficulties are due to the lack of a consistent framework by which to interpret the data. Additionally, a fallacious dichotomy confounds many discussions of findings that have emerged from this data. The aim of this project is to provide a framework for future discussions of both theory of mind and social emotion. So doing will pave the way for fruitful applications of future social neuroscientific findings related to such key social emotions as empathy and compassion.

Disclosures: H. Storl: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.02SA/CC15

Topic: J.01. History of Neuroscience

Title: History of Canavan disease: Progress in research over 80 years

Author: *A. NAMBOODIRI¹, M. F. KIRMANI², M. F. KIRMANI², R. VENGILOTE², N. PUTHILLATHU²;

¹USUHS, Bethesda, MD; ²Uniformed Services Univ. of Hlth. Sci., Bethesda, MD

Abstract: Canavan Disease (CD) is a fatal, devastating leukodystrophy which was diagnosed by Myrtelle Canavan in 1931 as spongiform degeneration of the brain. Advances in research of

this rare disease over the period of 88 years will be discussed. Little progress was made in the pathogenesis of CD till 1988 when Matalon and his co workers identified it as a result of aspartoacyclase deficiency. Creation of CD mouse knockout model and the gene therapy experiments conducted on it over the next decade led to a new chapter for gene therapy as potential cure for canavan disease. This led to human trials conducted by Dr. Leone and colleagues but the results were not that promising. The other notable research came from Dr. Namboodiri and colleagues in 1990's about the significance of N-acetyl aspartate in CD which span over two decades and which led to the hypothesis of the use of acetate supplementation as a potential therapeutic option for CD. This group published the results of the low dose glyceryl triacetate (GTA) trial in infants and high dose impact in tremor model rat but still further studies and larger, multicenter trials are needed to further test the significance of acetate supplementation towards the possible therapeutic option for this rare disease.

Disclosures: **A. Namboodiri:** None. **M.F. kirmani:** None. **M.F. Kirmani:** None. **R. Vengilote:** None. **N. Puthillathu:** None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.03SA/CC16

Topic: J.01. History of Neuroscience

Title: Little, Osler, Freud, and beyond: Cerebral palsy throughout history

Author: **K. STANG**¹, ***N. KING**²;

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Abstract: Cerebral palsy (CP) has afflicted children and puzzled medical practitioners since antiquity. The study of the disorder required the interplay of orthopedics, obstetrics, and neurology as it became apparent that its etiology is related to perinatal events resulting in nervous system damage. William Little was first to seriously study CP and asserted that CP is related to hypoxic brain injury during delivery. William Osler coined the term “cerebral palsy” and further examined the link between neurological damage at birth and clinical manifestations. The creation of societies dedicated to advocacy of CP helped understanding of the disorder progress. Attempts to accurately define and classify CP were made throughout the 20th century, culminating in an international conference in 2006 that laid out the current clinical definition. Investigations into the multi-factorial etiology of CP continue while significant progress has been made in ancillary fields to promote greater quality of life for those afflicted.

Disclosures: **K. Stang:** None. **N. King:** None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.04SA/CC17

Topic: J.01. History of Neuroscience

Title: Pioneering studies of spatial behavior in animals: Beritashvili and Tolman

Author: *M. G. TSAGARELI;

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Abstract: Ivane S. Beritashvili's doctrine of image-driven behavior was established in the late 1920s. It bears a strong resemblance to the concepts of purposive behavior and "cognitive maps" developed in parallel by Edward C. Tolman and significantly anticipated respective modern concepts. John O'Keefe and his disciples May-Britt Moser and Edward I. Moser got Nobel Prize in 2014 for their discoveries of cells that constitute a navigation system in the brain. The latter fact brings us to the pioneers of the study of the spatial orientation of animals that figuratively, provided the giant's shoulders on which O'Keefe and spouses Moser stood to receive their award. In contrast to the orthodox behaviorists, Beritashvili and Tolman - in line with the theories of Gestalt psychology - upheld the holistic and goal-directed nature of behavior. In 1928, Ivane Beritashvili started studying feeding behavior by the method of free movements. His major contribution to the science of animal behavior was the demonstration of the universality of learning following a single presentation of an object vitally important to the animal: either a food object or a noxious signal. He postulated that following a single presentation of such objects, an image may be formed of them in the brain, and thereafter the behavior of the animal proceeds as if it actually saw the represented object. Beritashvili showed that such "*image-driven*" behavior has a strong spatial component, i.e., the image is projected into a definite point in space. Beritashvili first summarized his theory in 1932 (in Russian) and then extended in his next books in Russian (Beritov, 1947) and in English (Beritashvili, 1965, 1971).

Edward Tolman made several significant contributions to the field of experimental psychology. He thought of learning as developing from bits of knowledge and cognitions about the environment and how the organism relates to it. Tolman examined the role that reinforcement plays in the way that rats learn their way through complex mazes. These experiments eventually led to the theory of latent learning which describes learning that occurs in the absence of an obvious reward. His idea was presented in his book *Purposive Behavior in Animals and Men* (1932). Tolman is generally credited with the introduction of the term "*cognitive map*" (1948). Tolman's concepts on latent learning and cognitive maps helped pave the way for the rise of cognitive psychology. To a great extent, Tolman's work determined the direction of American

psychology in the 1930-1950s. The contribution of Ivane Beritashvili and Edward Tolman, thus, is the groundwork of modern studies of spatial cognitive processes in animals and men.

Disclosures: M.G. Tsagareli: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.05SA/CC18

Topic: J.01. History of Neuroscience

Title: A new comprehensive view of the role of glia after an ischemic stroke: An integrative model of systematic review

Author: J. M. GASPAR-TORO¹, A. S. PEREZ-RUIZ², S. J. FLOREZ-ROJAS², *Z. DUENAS¹;

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Abstract: Ischemic stroke is a priority public health disease, the second cause of death and disability in the world, after an ischemic stroke, the research traditionally have been focuses on neurons although in recent years, glia has become a new reference to understand the pathophysiological process and the possible treatment objectives. The number of scientific publications increases exponentially every day and when a study or design is going to be carried out, it is often not possible to cover the subject. The systematic review is a way to integrate and synthesize the information to facilitate this process, however, in basic sciences the publication of this type of works is not frequent. The purpose of this study is to design a systematic review model to identify, evaluate and synthesize basic science research on the role of neuroglia after an ischemic stroke in the specific subtypes oligodendrocytes, glia NG2 (oligodendrocyte precursor cells) and the extracellular vesicles, with an approach that allows the integration of basic and applied science research, because in the scientific literature it is found that oligodendrocytes and NG2 have characteristics of auto-regeneration, cellular conversion, as well as their connection with transport processes and the effect of extracellular vesicles. With the results It is expected improving access to information, which may influence the management of ischemic stroke as a prioritized public health problem, as well as in many other fields that may use the proposed model.

Disclosures: J.M. Gaspar-Toro: None. A.S. Perez-Ruiz: None. S.J. Florez-Rojas: None. Z. Duenas: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.06SA/CC19

Topic: J.01. History of Neuroscience

Title: Budge, Waller, and Bernard: Sympathetic control of head structures

Author: ***B. W. BAKKUM;**

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Abstract: Two main groups of researchers appear to have been conducting experiments in the 1850's aimed at defining the neural circuitry involved in the autonomic control of structures in the head. Julius Ludwig Budge (1811-1888) did most of his research on the autonomic nervous system in Bonn. During much of this time, he collaborated with Augustus Volney Waller (1816-1870). In 1839, Waller had discovered in frog tongues the phenomenon that would later be known as wallerian degeneration. In 1851 he moved to Bonn to work with Budge. Working mostly on frogs and anesthetized rabbits, Budge and Waller appeared more interested in the control of the pupil, although they also made observations of vasomotor and other effects. The other research group, based in Paris, was headed by Claude Bernard (1813-1878). Bernard focused mainly on vasomotor control and seemed to only secondarily observe pupillary and other phenomena. Also, Bernard was a vivisectionist, choosing to work mostly on dogs with no anesthesia. In 1851, Budge and Waller, using Waller's nerve fiber degeneration technique, found that the fibers of the sympathetics to the head had their origin in the spinal cord, specifically from the first and second thoracic segments. They called it the ciliospinal center. If they sectioned the fibers at their origin, the same autonomic effects in the head were produced as by sectioning the sympathetic chain in the neck. In 1852, Bernard was the first to make a complete study of all of the effects of sectioning and stimulating the cervical portion of the sympathetic chain. In 1853, The Edinburgh Medical Journal published an English translation of what we might call a review article that Budge wrote in German in 1852. In this, he outlined his experimental findings, giving credit to Waller where appropriate. Even though Budge recognized more than a few other researchers for their previous contributions to the field, he did not mention Bernard. Immediately following this article, in the same issue, the editors of the journal chose to publish an article by Bernard. In this article Bernard proceeded to give a timeline showing how he found many of the same findings as Budge and Waller before they did and had described them better. Even though Bernard gave a fuller account of the effects of the sympathetics to the head, it is the other group that has been bestowed the honorific of an eponym. The preganglionic sympathetic neurons supplying structures in the head that are found in the lateral horn of the upper thoracic levels of the spinal cord are commonly known as the ciliospinal center of Budge, although an argument could be made that Waller's name should be included, since it was his technique that led to the discovery.

Disclosures: **B.W. Bakkum:** None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.07SA/CC20

Topic: J.01. History of Neuroscience

Title: A historical perspective of urinary bladder dysfunction following spinal cord injury

Author: ***B. T. DAVID**, G. LIU, R. G. FESSLER;
Neurolog. Surgery, Rush Univ. Med. Ctr., Chicago, IL

Abstract: Spinal cord injury (SCI) is comprised of both a primary injury and a secondary injury cascade, both of which are involved with the eventual effects on motor, sensory, and autonomic function. One of the most well characterized autonomic functions affected after SCI is that of the urinary bladder. The disruption in the ability of injured individuals to store urine in, and periodically empty, their bladder was described as early as the Edwin Smith papyrus thousands of years ago. Until the advent of penicillin, urinary tract infections were the leading cause of death in those with an SCI. And currently, genitourinary system diseases are still the leading cause for re-hospitalization in the SCI community. As such, the monitoring and management of neurogenic bladder secondary to SCI has been a foremost concern in the overall health and quality of life of those who have suffered an injury. Multiple strategies have been utilized for both characterizing and improving bladder dysfunction following SCI, utilizing multiple animal models and human studies. Of these, renal function, urinalysis, urodynamic studies, and ultrasonographic techniques have been shown to be the most reliable indicators of bladder function. Kidney and bladder wall histology have also been useful markers of urinary tract function in animal models of SCI. This study reviews both the clinical management of neurogenic bladder in the spinal cord injured community as well as and the preclinical experiments designed to better characterize and minimize urinary bladder dysfunction following spinal cord injury.

Disclosures: **B.T. David:** None. **G. Liu:** None. **R.G. Fessler:** None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.08SA/CC21

Topic: J.01. History of Neuroscience

Title: This history and significance of the golgi stain and those it impacted

Author: *M. S. KASSEM;

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Abstract: The study of cellular morphology within the nervous system has contributed crucial information to neuroscience. Camilo Golgi and Ramon Cajal, together shared the 1906 Nobel Prize in medicine in recognition of their work on the structure of the nervous system, which was studied via the now Golgi stain, developed by Golgi and used by Cajal (originally called the black or reduced silver nitrate stain). Cajal's work is often seen as the standard by which neuronal morphology is analysed. In fact the Golgi stain remains the gold standard for studying changes in neuronal morphology offering the greatest detail and clearest spine visualisation. And it was from these stains, and the many others that followed, that the study of neuroscience expanded allowing us to understand the nature and purpose of the axon, the dendrite, the soma and one of the most significant discoveries the synapse. It was, and continues to reveal, that these features of the neuron can change in both healthy and unhealthy conditions and that these changes can manifest themselves in both physical and psychological ways. Cajal's major body of work "Histology of the Nervous System Vol. 1 & 2", remains one of the most enjoyed and cited publications within neuroscience, and his work continues to be analysed, in fact recent historical research has revealed that it was in fact Sherrington's work and subsequently Berkley's that identified the excitatory synapse. Moreover, histological research has shown that the Golgi stain is in fact fluorescent, and may yet continue to play a role in neuroscience for years to come.

Disclosures: M.S. Kassem: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.09SA/CC22

Topic: J.01. History of Neuroscience

Support: James S. McDonnell Foundation, "Transforming Discovery: Historians, Philosophers, and Life Scientists Exploring Regeneration," 2019-2021

Title: Neurons in context: Neuronal regeneration and disciplinary struggles in the first half of the XX Century

Author: *F. DE SIO;

Inst. Für Geschichte, Theorie Und Ethik Der Medizin, Heinrich Heine Univ., Düsseldorf, Germany

Abstract: The first dispute over the structure of the nervous system, between the “neuronists” led by Ramon y Cajal, and the “reticularists” following Golgi’s theory of the “diffuse net”, is a landmark in the history of biology, and as such has been the object of sustained scholarly attention. This poster will consider the second phase of the controversy, triggered in the early 1900s by the German physiologists Hans Held and Albrecht Bethe. Whereas the first neuron-dispute was fought on the turf of morphology, of novel histological techniques and the correct interpretation of (often the very same same) images, the second took place on a more open and complex space. I will take the move from Bethe and Held’s regeneration theories, and from the responses of Cajal and collaborators, and frame the two conflicting approaches in their respective epistemological and institutional settings. Unlike the Cajal-Golgi dispute, in fact, the one here analysed was not internal to morphological science, but affords a critical outlook on one front of “the revolt against Morphology”, involving conflicting disciplinary perspectives, experimental approaches and epistemic virtues. Whereas the anatomist Cajal was guided by the ideal of objectivity and analysis, Held and Bethe were institutionally and epistemologically placed at the intersection of physiology and neurology. The controversy over regeneration of peripheral and central neurones can thus be interpreted as more than a vocal disagreement on a well-defined problem. It rather took place along a gradient, spanning from the intrinsic regenerative properties of the neuron, through the issue of peripheral nerve repair (made more pressing by World War I), to the more general question of the plasticity of the Central Nervous System (both at a physiological level, with reference to the reflex theory, and at a neurological one, in connection with e.g. the scourge of multiple sclerosis and degenerative diseases). From cell - to tissue - to organ. Although neither Cajal nor his adversaries completely neglected any of these levels, consideration of their specific (institutional and epistemological) vantage point helps to better grasp the reasons of the two camps, beyond the simplistic distinction between winners and losers.

Disclosures: F. De Sio: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

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Topic: J.01. History of Neuroscience

Support: James S. McDonnell Foundation, “Transforming Discovery: Historians, Philosophers, and Life Scientists Exploring Regeneration,” 2019-2021
Association for Cephalopod Research – CephRes, Napoli, Italy

Title: Tissue regeneration: Cephalopod contribution over more than a century

Author: *P. IMPERADORE^{1,2}, G. FIORITO²;

¹Assn. for Cephalopod Res. - CephRes, Napoli, Italy; ²Stazione Zoologica Anton Dohrn, Napoli, Italy

Abstract: The ability of cephalopods in surviving injuries is well known since antiquity. A description of the events is traceable in *Historia Animalium* by Aristotle (400 - 300 BC). However, it is only in 1856 that regeneration of appendages in octopods was formally described by the Danish zoologist, J.J. Steenstrup. In his article, while accounting for the formation of the hectocotylus (i.e. sexual arm) in *Argonauta* and *Tremoctopus*, the Author provided information on the ability of healing and regenerating arms in octopods damaged or lost during copulation. After this first scientific publication, several works expanded the knowledge on the ability of several coleoid cephalopods (namely cuttlefish, squid and octopus) to regenerate parts and tissues. Notable regenerative capabilities have been shown for several tissues, including peripheral and central nervous system, muscles, skin and peculiar structures such as the cornea or the shell, as deduced from the fossil records.

However, macroscopical and microscopical investigation of the regenerative phenomena was carried out only after about 70 years after the first published record (Lange, 1920). Between the end of the third and fourth decade of the XXth century, the famous English zoologist J.Z. Young while working at the Stazione Zoologica in Napoli, focused his research on the study of the nervous system of marine animals discovering the squid giant axon, thus laying the foundation for modern neurobiology and the study of the brain. Together with his collaborators he also identified in cephalopods the possibility to restore the structure of peripheral nerves after damage, using the stellar and pallial nerves as case study. These nerves control skin patterning and respiratory movements; the interruption of the circuit with the CNS determines loss of these fundamental functions which are however completely recovered after a while (after crush or complete transection). The study of regeneration in cephalopods continued till nowadays. Here we want to provide an overview of the most relevant studies, focusing on the evolution of discoveries and how these advanced thanks to novel methods and approaches including: genomic/proteomic analyses, cell labeling, and label-free imaging. Researchers are indeed committed in establishing new strategies for the study of regeneration in this taxon. This continued effort is still promising and is believed to contribute to the advancement of knowledge on regenerative phenomena and its biological underlying cellular and molecular processes.

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Theme J Poster

021. History of Neuroscience

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Support: James S. McDonnell Foundation, “Transforming Discovery: Historians, Philosophers, and Life Scientists Exploring Regeneration,” 2019-2021 (to KMJ, PIs Drs. Kate MacCord, MBL, and Jane Maienschein, Arizona State University and MBL)
MBL institutional funds (to JRM)

Title: Experimental organisms, neuron regeneration, and the curious case of the lamprey in the history of the neurosciences, 1960-present

Author: *K. G. MAXSON JONES¹, J. R. MORGAN²;

¹Program in History of Science, Dept. of History, Princeton Univ., Princeton, NJ; ²Eugene Bell Ctr. for Regenerative Biol. and Tissue Engin., Marine Biol. Lab., Woods Hole, MA

Abstract: Regeneration of neuronal structure and function following central nervous system (CNS) injury is a problem of great relevance to biology and medicine. Biologists have studied neuronal regeneration since at least the 19th century, and historians have begun to analyze the reasons why they have chosen to study this phenomenon in certain organisms over others. The lamprey emerged as a model for investigating CNS regeneration around 1960. Analyzing the scientific literature, archives, historiography, and interviews, we explore: (1) key reasons for the lamprey’s rise in this field; (2) major points in the development of the lamprey model from the 1970s to the 2000s; and (3) problems in lamprey CNS regeneration research today. We argue that despite a lack of molecular tools until recently, a combination of large, identified neurons, robust CNS regeneration, and an early branching position in the vertebrate phylogeny have sustained the lamprey as an experimental organism in neurobiology for 60 years. The significance of these characteristics in the discipline, however, has changed. From 1959 to 1967, Marón, Hibbard, and Rovainen separately studied structural regeneration in lamprey spinal cords following complete transection, alongside functions and connections of CNS neurons. Other contemporary models, such as cats, had small, unidentifiable neurons with poor CNS regeneration; others still, such as cephalopods, regenerated peripherally but lacked backbones. Injuries sustained in 20th century wars gave neuron regeneration particular medical relevance, but it also drew basic scientific interest. Social networks at coastal laboratories, such as those surrounding invertebrate neurobiology at the MBL, promoted broader study of identifiable aquatic neurons, including in fish. From the 1970s through the 1990s, several papers explored functional recovery in the lamprey spinal cord via the continuity of electrical signaling across injury sites, as well as the specificity and directionality of axon regeneration and new synaptic connections. Amidst shrinking budgets, funders’ pushes towards translational research promoted such approaches. In the 1990s and 2000s, the heyday of brain-centered neurobiology, there also arose quantitative assays for the recovery of swimming behaviors, and early gene expression studies. The genome followed in 2013. The strength of the lamprey regeneration model now rests on the ability, and potential, to ask “old” questions of large, CNS, vertebrate neurons using current molecular analyses. The application of such tools to this enduring anatomo-physiological model will uncover unique avenues for biology, and perhaps therapy.

Disclosures: K.G. Maxson Jones: None. J.R. Morgan: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.12SA/CC25

Topic: J.01. History of Neuroscience

Title: The primate's place in our understanding of hippocampal function

Author: ***R. A. GULLI**;
Columbia Univ., New York, NY

Abstract: The hippocampus is a striking area of the mammalian brain; it is the phylogenetically oldest area of our cortex, with a conspicuous anatomical structure that has captured the interest and ire of anatomists, naturalists, physicians, physiologists, and neuroscientists for centuries. Its anatomical structure is instantly recognizable, and has not markedly diverged across species for millions of years.

The contemporary understanding of the hippocampus is that this region receives highly processed information from all sensory modalities, and that this information is processed to subserve two cognitive functions: memory and spatial navigation (Schiller et al., 2015). One compelling theory suggests the primacy of spatial information in the mammalian hippocampus; furthermore, that this network has been co-opted through evolution to subserve memory by providing a spatial context for objects and events to be anchored through time (Buzsáki and Moser, 2013). This theory is driven forward by a wealth of literature in rodents completing tasks that require spatial navigation (see Moser et al., 2017). An alternative theory argues that the primary function of the hippocampus is memory, with information related to space, time and sensory percepts being bound as conjunctive representations in neural ensembles in the hippocampus (Eichenbaum, 2017a). This theory is substantiated by a vast literature on hippocampal function in humans (see Elward and Vargha-Khadem, 2018; Maguire et al., 2016; Clark and Maguire, 2016). Proponents of either theory have deemed each the evolutionarily distal *raison d'être* of the hippocampus.

These are just two of many historical theories of hippocampal function with modern prominence. Our understanding of hippocampal function has evolved at an incredible pace over the last two centuries, generating theories that show all the hallmarks of natural selection and common descent. Here, I will provide a detailed account of this evolutionary path, with a special focus on studies conducted in non-human primates. I hope that this historical look back adds important context for those scientists who carry these theories of hippocampal function forward.

Disclosures: **R.A. Gulli:** None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.13SA/CC26

Topic: J.01. History of Neuroscience

Support: NIH/National Institute on Drug Abuse - Intramural Research Program

Title: History of psychedelics in neuroscience - From 19th century to modern medicine

Author: *M. A. BOEHM^{1,2}, D. P. EFFINGER¹;

¹Natl. Inst. on Drug Abuse, Baltimore, MD; ²Brown Univ., Providence, RI

Abstract: For over a century, psychedelic compounds have been intertwined with the progression of neuroscience. Named for their “mind-manifesting” properties, the term psychedelic usually refers to specific phenethylamines (e.g. Mescaline), ergolines (e.g. Lysergic acid diethylamide (LSD)) and tryptamines (e.g. *N,N*-dimethyltryptamine (DMT) and Psilocybin). The term can also encompass certain dissociative anesthetics (e.g. Ketamine), entactogenic amphetamines (e.g. 3,4-methylenedioxymethamphetamine (MDMA)) and atypical psychedelics (e.g. Ibogaine). Many of these compounds are naturally occurring and have been used by humans for thousands of years. Scientific investigation of psychedelics arose in the late 19th century with interest in the psychoactive effects of the peyote cactus *Lophophora williamsii*. Mescaline was identified as the plant’s active alkaloid by Arthur Heffter in 1897. Mescaline research continued into the early 20th century with its synthesis in 1919 and its use as a tool to study psychoses in the 1930s. Then in 1938, Albert Hofmann synthesized LSD for the first time while working with ergot alkaloids for Sandoz Pharmaceuticals. Five years later, he was accidentally exposed to the compound and experienced its powerful psychoactive effects. His discovery catalyzed the rising field of psychopharmacology in the 1940s-50s and helped scientists recognize the role of serotonin in consciousness. This set the stage for a plethora of studies exploring potential therapeutic uses of LSD and other psychedelics in the 1960s and early 1970s. However, unregulated misuse of these compounds led to their illegalization during this time. Human psychedelic research was hindered following these regulations, but animal studies continued through the 1980s and gained evidence for a mechanism involving 5-HT₂ receptor agonism. Then in the 1990s, the “Decade of the Brain” produced rapid advances in neuroscientific tools and understanding. These developments supported a gradual reemergence of human psychedelic research beginning with studies on the effects of DMT and ketamine in the 1990s and early 2000s. Since this time, a new wave of research is continuing to explore the neural mechanisms and therapeutic uses of psychedelics. Recent studies indicate the temporary disintegration of brain networks and the initiation of molecular cascades promoting neural plasticity. In addition, the FDA has granted “breakthrough therapy” designations for certain psychedelic-assisted therapies. With lessons from the past and tools for the future, neuroscience will play an objective role in guiding new regulations on psychedelic use in society. (Supported by NIH-NIDA IRP)

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Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.14SA/CC27

Topic: J.01. History of Neuroscience

Title: DW Woolley, LSD, and the birth of psychopharmacology

Author: *G. C. MCCARTER;

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Abstract: Dilworth Wayne Woolley (1914 - 1966), a Canadian biochemist who spent his entire career at Rockefeller Institute, appears to be the first person to have hypothesized that a specific molecule, namely serotonin, “plays a role in the maintenance of normal mental functions.” In 1937, Woolley showed that nicotinic acid was the vitamin deficient in a canine model of pellagra. Observations that pellagra could be accompanied by a form of psychosis may have planted the seed of the idea that vitamins or hormones play a role in mental illness. In his work, Woolley developed and refined the guiding concept of the power of “antimetabolites” to elucidate the structure-function relation of vitamins, hormones, and other biochemical agents, summarized in his 1952 book, The Study of Antimetabolites. He used these concepts to publish, with E.N. Shaw, a groundbreaking, purely theoretical paper in 1954 entitled “A biochemical and pharmacological suggestion about certain mental disorders” in *Science* (as an abstract) and *PNAS*. He took three recently published observations—that the newly isolated “hormone” serotonin was found in the brain, that lysergic acid diethylamide produced “visions” similar to psychosis, and that LSD was an antimetabolite of serotonin with a common structural core—to posit that psychoses and other mental illnesses could be caused by a biochemical deficiency or dysfunction. Psychiatry at the time was dominated by Freudian concepts of the origins of mental illness through purely psychodynamic events due to the inability to find any organic causes in the brain. JH Gaddum is sometimes credited with also proposing a relation between serotonin and mental processes at virtually the same time, also based on the action of LSD, but he never related serotonin to mental illness and published very little else on the role of serotonin in the brain or mind. While chlorpromazine was discovered around the same time, its mechanism of action was unknown and no one was moved to hypothesize any possible biochemical basis for its effectiveness until some time later. Woolley continued to develop his ideas through the fifties and early sixties culminating in a 1962 monograph entitled The Biochemical Bases of Psychoses or the Serotonin Hypothesis about Mental Diseases. He also helped popularize the idea of physiological causes for mental illness with a 1965 article in the *Atlantic Monthly* entitled “New

Insight into Mental Illness: Philosophical Implications.” He tragically died shortly thereafter of a heart attack at age 52 while visiting Cuzco, Peru.

Disclosures: G.C. McCarter: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.15SA/CC28

Topic: J.01. History of Neuroscience

Title: Social neuroscience: A new approach to the study of the consequences of violence

Author: *X. CORTIJO-PALACIOS¹, O. LOPEZ-SANCHEZ²;

¹Univ. Veracruzana, Xalapa, Mexico; ²Univ. Autonoma de Mexico, Estado de Mexico, Mexico

Abstract: Social neuroscience emerged in 1992 from the union of two scientific disciplines: social psychology and neurosciences. The social neuroscience is a discipline that analyzes the impact of social factors in human health and animal’s models, examining the nervous, immune and neuroendocrine systems, allowing an interdisciplinary approach of analysis to the biological and social factors that can influence the development of diseases. In other words, social neuroscience examines the neural relationship of social psychological problems, using all tools of both disciplines as neuroimaging techniques, social psychology, political and economic sciences. The study of violence has been done by different individual perspectives however, their analysis from the social neuroscience view is limited. Violence has defined as an altered aggressiveness, were due to sociocultural factors it stops being an innate behavior originated by a stimulus to become an intentional harmful behavior. Investigations in social science analyze violence from macro-social relationships, where is it used as a tool of domination. Two forms of violence are identified, the first is overt violence which affects the life or physical integrity of individuals or groups where their manifestations are quantifiable (beatings, rape, murders). And the second is structural violence where the conditions of society observed, and their consequences are impossible to attribute to specific individuals. On the other hand, the neuroscience analyzes violence from the subject seen as an individual, exploring the participation of different brain areas in people with violent behavior, finding abnormalities related to the performance of the orbitofrontal cortex, the ventromedial prefrontal cortex, the anterior cingulate cortex and the amygdala, structures that integrate cognitive and emotional systems. In Mexico, the levels of violence increase every year and with it the negative effects on the health of people. However, there are few studies that use social neuroscience for their analysis, although it is known that exposure to violence either direct or indirect, causes a negative impact on health. And it has been shown that there is a correlation between a higher frequency of exposure to different types of violence (intrafamily, couple, sexual, school, work)

with the development of mental health problems such as anxiety and depression. Therefore, is necessary the study of the consequences of violence at a physiological and emotional level should be approached from the perspective of social neuroscience, determining the contribution of neuronal, cognitive and emotional aspects in social behavior.

Disclosures: X. Cortijo-Palacios: None. O. Lopez-Sanchez: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.16SA/CC29

Topic: J.01. History of Neuroscience

Title: The long historic road to consensus on biomarkers for psych-psych taxonomies: Convergence of multi-disciplinary insights

Author: *I. TROFIMOVA;
McMaster Univ., Hamilton, ON, Canada

Abstract: This poster reviews the multi-disciplinary convergence of classic models of consistent behavioural traits offered throughout the history of psychology and psychiatry with modern findings in functional neurochemistry. Temperament is viewed here as neurochemically-based individual differences, in line with the original Hippocrates' concept. Over 40 theories and models of temperament based on the different bio-psychological traditions are compared to findings in neuroscience, neurochemistry, psychophysiology, neuropsychology, personality theory and psychiatry. The functionality of neurotransmitters, neuropeptides and opioid receptor systems, as well as the lists of temperament traits, are analysed from the functional ecology perspective, which considers the development of the structure of adult temperament as a result of certain functional properties of the tasks and activities of adult humans. The poster summarizes over 200 overlapping entries of temperament characteristics described in various models of differential psychology and psychiatry in the past 150 years. It underlines several key insights, which emerged within differential psychophysiology and psychology during the 20th-21st century. These insights lead to the identification of 12 universal biologically based components of behavioural regulation that can structure classifications of biomarkers associated with proposed taxonomies. The introduced model presents a framework allowing a common "psych-psych" (bio-psychological and psychiatric) taxonomy that would classify both, temperament traits (in healthy individuals) and psychopathology (when the traits become extreme).

Disclosures: I. Trofimova: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.17SA/CC30

Topic: J.01. History of Neuroscience

Title: Rufus of Ephesus - The precious historical insight into neuroscience

Author: *G. SENGUL¹, E. CANDAR²;

¹Anat., Ege Univ. Sch. of Med., Izmir, Turkey; ²Neurosci., Ege Univ. Inst. of Hlth. Sci., Izmir, Turkey

Abstract: Ephesus is a World Heritage City, located in Izmir, was home to many civilizations as a center for philosophy and medicine. Rufus was an eminent physician from Ephesus. A bridge between Hippocrates and Galen, Rufus (80-150 AD) was one of the four excellent physicians for the Byzantines and extensively quoted by Rhazes, Avicenna, Ibn el Baitar, and by several Arabic authors. He studied anatomy, physiology, pathology, psychiatry, medical botany, nephrology and a wide range of medical and surgical illnesses. He observed an important correlation between pulse and heart systole. It was the first consideration as an attempt to base pathology on anatomy and physiology. Rufus described the optic chiasm for the first time, as well as the differences between motor and sensory nerves. His observations on the anatomy of eye and lens was very detailed. His famous book of "On Melancoly", in addition to the four humors theory described the hypochondriac type of melancholy and its origins that may be attributed to the autonomic nervous system in our current understanding. Development of anatomical terminology was affected majorly by his anatomy manual (*Elementary Treatise of Anatomy*) and Rufus' lexicon (*Onomastikon*). His pioneering work presented anatomical nomenclature according to a systematic description *via* using relevant terminology that includes position, shape, and functions of organs and visible and invisible parts from head to heel. He demonstrated the internal workings of human organs without human dissection by using comparative anatomy of the monkey and pig. The significant source for anatomy is 'Onomastikon' was comprised of neuroanatomy terminology mostly. Due to the forbiddance of human dissection, he made major contributions to neuroscience using comparative anatomy. With his descriptions of *meninges of encephali, medulla spinalis, choroid plexus, motor and sensory neurons*, difference between *medulla ossium (bone marrow)* and *medulla spinalis, nervus vagus, optic chiasm, foramen magnum, varicous (telencephalon)* and *parencephal (cerebellum)*, Rufus of Ephesus was definitely ahead of his time.

Disclosures: G. Sengul: None. E. Candar: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.18SA/CC31

Topic: J.01. History of Neuroscience

Title: Mazhar Osman: A distinguished scientist who shed light on the history and future of neuropsychiatry in Turkey

Author: *E. ULUPINAR, B. ERCELEN;
Anat., Eskisehir Osmangazi Univ., Eskisehir, Turkey

Abstract: During the Ottoman Era, mentally ill people were traditionally kept in small asylums incorporated in religious complexes. The medical practice of the 19th century was fluctuating between science and religion. The practice of modern psychiatry started at the Neurology and Psychiatry Service in the military medical school, in İstanbul in 1896. Mazhar Osman (1884-1951) is one of the most important names in modern Turkish psychiatry history. During the truce period (1918-1922), with the initiation of Mazhar Osman, “Reşadiye Barracks” in Bakırköy, abandoned and dilapidated after the French soldiers, were turned into a new, modern mental hospital. Following the establishment of the Republic of Turkey, he gave his proposal to the new government in 1924 and the Council of Ministers decided to use this region for foundation of a mental health institution in İstanbul. This first hospital was opened in 1927 with the name “Mental and Neurological Illness Hospital” and Mazhar Osman was appointed as the head doctor. The hospital was twenty-minute walking distance from the train station and there was no other public transportation. In these years, due to extended periods of treatment, the length of hospitalization was quite long. Therefore, a large pine forest was established as the backyard of the hospital. In 1934, twenty pavilion were added to the main building, and in 1935, the first polyclinic building was built. The central building and the dining hall were opened in 1938. Following the university reform in 1933, psychiatry and neurology clinics of the İstanbul University were located in Bakırköy Mental Hospital. In the 1960s, numerous sewing workshops were organized especially for male patients. Then, many others were added to increase the variety of interests for both treatment and rehabilitation purposes. Mental Health Festivals, called as “Mad Fests”, was started to be held every year in June. Bakirkoy Mental Hospital has continually transformed in parallel to changing medical standards and is still a major education and research hospital dedicated to psychiatry, neurology and neurosurgery. It is now called “Bakırköy Ord.Prof.Dr. Mazhar Osman Mental Health and Neurology Training and Research Hospital” after Mazhar Osman. In 2008, an Institutional Historical Museum was opened to share the historical and cultural leadership of the hospital in the fields of psychiatry, neurology and neurosurgery in Turkey. In this museum, diagnostic and therapeutic equipment, institutional materials, documents, notebooks of surgical operations, personal and professional articles of all the chief physicians served in the hospital since the date of Mazhar Osman are displayed for visitors.

Disclosures: E. Ulupinar: None. B. Ercelen: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.19SA/CC32

Topic: J.01. History of Neuroscience

Title: The music of JS Bach: Useful data sets to study perception and movement and using modern neuroscience methods to test historical theories

Author: *E. L. ALTSCHULER;
Metropolitan Hosp., New York, NY

Abstract: Despite technologic advances, given the complex, multivariable nature of neuroscience it remains useful to study historic sources such as the music of JS Bach (1685-1750) to find new useful data sets. Modern neuroscience methods can also be used to test historical theories, and historical sources can even suggest new disease treatments. (1) Since Bach died 65 years before the metronome was invented it seems impossible to know with any precision the tempo at which Bach's pieces should be played. However, in Bach's time there was a well-appreciated idea of a tempo ordinario (TO) or default tempo at which to play a piece unless specifically otherwise indicated. The TO was a brisk one, understood to be faster than Adagio, slower than Presto, and equivalent to a marking of Allegro. Most other tempos would be in proportion to the TO, e.g., Adagio twice as slow, presto twice as fast. Quinn and Watt (2006) showed that simply using the judgment "too fast" or "not too fast" subjects can come to a consensus on the best tempo for a piece. This procedure could be used to establish Bach's TO, to see if it is universal across Bach's opus (and if so with what standard deviation) and to see if there is a different TO for dance movements (TO_dance) Bach's courantes to be played at this tempo and a sarabande, e.g., at half this tempo. (2) Interestingly, while there are about 600 tempo word indications in Bach's manuscripts there are less than ten instances where Bach uses a word to indicate affect. This suggests that tempo, instrumentation and texture of notes in a piece can imply, indeed specify the affect. (3) Libet (1983) showed that brain potentials can precede even the intention to move by hundreds of milliseconds. Perhaps secondary to this, in playing Bach's solo cello works I find it hard at times to play "one thing at once," e.g., D string vs. expected A string (BWV 1007/1 mm 33-36), 1st finger regular vs. extended (BWV 1010/6, m 37) or down bow vs. up. (4) Aphasia is a not uncommon sequela of a left brain stroke, and there is a need for effective treatments. Melodic intonation therapy (MIT) is a proposed treatment based on the idea that if music is represented in the right brain, then singing can be used to improve communication after stroke. Practically MIT has not been particularly effective, e.g., the occasional individual after stroke can sing multiple songs, but still not utilize this at all for speech. Bach's choral works include not only arias, but recitatives—singers recite texts to a sparse melody with only light accompaniment. Perhaps recitative style singing—recitative

intonation therapy (RIT) could be used to bridge and utilize intact right brain singing to assist diminished speech following left brain stroke.

Disclosures: E.L. Altschuler: None.

Theme J Poster

021. History of Neuroscience

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 021.20SA/CC33

Topic: J.01. History of Neuroscience

Support: CONACYT 1840

Title: Tumor necrosis factor alpha and depression

Author: *F. SANCHEZ-LADRON DE GUEVARA¹, D. HERNANDEZ-BALTAZAR², X. CORTIJO-PALACIOS³, M. MELGAREJO-GUTIERREZ¹, T. CIBRIAN-LLANDERAL³;

¹Facultad de Medicina, Univ. Veracruzana, Xalapa, Mexico; ²CONACYT- Inst. de Neuroetologia-Universidad Veracruzana, Xalapa, Mexico; ³Neurofisiologia y Neurobiologia de la Conducta, Inst. de Neuroetologia-Universidad Veracruzana, Xalapa, Mexico

Abstract: Since 1975, thanks to the discovery and hard work of Dr. Lloyd Old in his document published in "Proceedings of the National Academy of Sciences" is that we know the tumor necrosis factor (TNF) as such, this controversial and complex molecule, named because of its incredible ability to damage the tumor, has been studied since the late seventies for playing a key role in inflammation and immunity.

Several studies have focused on recognizing tumor necrosis factor alpha (TNF- α) as an endogenous pyrogen, which can cause inflammation, apoptotic cell death and mediate the release of various cytokines such as interleukins (IL-6, IL-8, and IL-1 β) by stimulation of macrophages deregulation, especially the overproduction of TNF- α , has been found in a wide variety of human diseases, including depression.

The inflammatory hypothesis proposed by Smith in 1991 called "macrophage" theory of depression has underlined from then the importance of psycho-neuroimmunological dysfunction when there is a stimulation of the immune system. Certainly, patients with depression have an abnormal peripheral immune system with weak cellular immunity and high levels of proinflammatory cytokines such as TNF- α . In addition, they have shown that proinflammatory cytokines have an effect on the pathophysiological domains, such as neuroendocrine function, regional brain activity and the metabolism of neurotransmitters, all of which contribute to the pathogenesis of depression.

Over the years through studies in animal models, administering TNF- α is that it was possible to observe the development of symptoms such as decreased social behavior and locomotor activity,

anhedonia, suppression of food intake, sleep abnormalities, fatigue and alterations in cognition. These symptoms are collectively known as "disease behavior," which is similar to patients with human depression.

Undoubtedly, recognizing the influence of TNF- α on neurotransmitter systems and obtaining a better understanding of the consequences of altered inflammatory responses can support not only patients with depression but also chronic degenerative diseases in which depression coexists.

Disclosures: F. Sanchez-Ladron de Guevara: None. D. Hernandez-Baltazar: None. X. Cortijo-Palacios: None. M. Melgarejo-Gutierrez: None. T. Cibrian-Llenderal: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.01SA/CC34

Topic: J.02. Teaching of Neuroscience

Title: Development of a novel science curriculum about neural stem cells for high-school students in Hong Kong

Author: *K. SUEN¹, M. LI¹, M. LIN¹, W. TANG², H. CHEUNG², W. CHAN¹, R. C. CHANG³; ¹Biol. and Biotech., ²Chem., Po Leung Kuk Laws Fndn. Col., Hong Kong, China; ³Lab. of Neurodegenerative Diseases, LKS Fac. of Medicine, Univ. of Hong Kong, Hong Kong, China

Abstract: We are a pioneer high school in Hong Kong to develop a neuroscience curriculum for scientifically gifted students (Suen et al., 2010; Suen et al., 2017). Research-based learning associated with neurodegenerative diseases (Suen et al., 2013), brain cell culture (Suen et al., 2008) and live-cell imaging microscopy (Suen et al., 2015) are highlighted in this curriculum. To further nurture high-school students to become a neuroscientist, we develop a new curriculum about neural stem cells. Public awareness in stem cell-related issues is increasing and more and more ethical concerns are raised as stem cell medicine advances. Yet, there is no well-structured curriculum about stem cell science for junior secondary school students in Hong Kong while the elective part of senior form Biology curriculum in Hong Kong contains a short chapter about stem cell therapy. In the present report, we demonstrate the two dimensions of our Neural Stem Cell Science Curriculum (NSCSC): (i) neural stem cell science lessons for all junior form students and (ii) pull-out gifted programme of neural stem cell research for scientifically gifted students. The neural stem cell science lessons are structured based on Renzulli's enrichment triad model (Renzulli and Reis 1997) in which students will be exposed to three types of learning activities. Type-1 learning activities target concept-building tasks. Type-2 learning activities involve practical skills of the concepts established in the type-1 learning tasks. Type-3 learning activities help students apply their skills and concepts learnt in type-1 and type-2 lesson activities to solve real problems. For scientifically gifted students, they will carry out scientific research

about neural stem cells. This research-based learning mode is integrated with the Purdue Three-Stage Enrichment Model in gifted education (VanTassel-Baska and Brown 2007). Some core concepts that all of our students are expected to acquire include the nature of neural stem cells, development and differentiation of neural stem cells, sources and locations of neural stem cells and potential applications of neural stem cells in medicine.

Disclosures: **K. Suen:** None. **M. Li:** None. **M. Lin:** None. **W. Tang:** None. **H. Cheung:** None. **W. Chan:** None. **R.C. Chang:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.02SA/CC35

Topic: J.02. Teaching of Neuroscience

Title: Student communication of science is an effective method for peer based learning

Author: *S. GUARIGLIA¹, A. MARINO², M. PATINELLA²;

¹New York State Inst. for Basic Res., Staten Island, NY; ²St. Joseph by the Sea HS, Staten Island, NY

Abstract: Student engagement in research is effective at providing them with an unparalleled, hands-on opportunity to learn about scientific processes and methodologies. However, the reporting of the results of the study by the students themselves to peers may be a highly effective method for broad engagement in the understanding of scientific research. In this work, we guided the research project of students who were interested in drug addiction, as it has become a significant problem in their community. The students utilized a planarian model to explore the heritability of drug addiction, using behavioral and imaging methodology. To understand if there is a heritable component of drug addiction, our students exposed planarians to 0.5 uM, 1 uM and 5 uM nicotine solution for seven days. They then amputated the head of the planarians and allowed the tails to regenerate new heads in nicotine free water for seven days. Once the planarians regenerated new heads, the students then performed behavioral assays to determine if planarians derived from the nicotine-exposed parental generation had a greater locomotor effect than those derived from non-exposed parents. Speed and distance traveled in the solution were tracked and recorded using a digital tracking system. The students found that the F1 generation planarians that resulted from nicotine exposed parents showed a significantly greater locomotor response when exposed to nicotine. Using c-fos expression and confocal imaging, the students also demonstrated that the sensory neurons of the planarians and sensory processing regions in the brains of the F1 generations derived from the parental nicotine-treated groups showed significantly greater activation when exposed to nicotine. This work allowed the students to understand some of the underpinnings of heritability of addiction. The students then went on to

present the work to their peers in a classroom setting. Using the same script and slides, classrooms of students who learned about the research from their peers performed significantly greater on a post-presentation questionnaire than did students who learned about the research from adults. The results of this work demonstrate that the communication of the work by the students to their peers is an effective method to educate students on science-related matters that are important in their lives.

Disclosures: S. Guariglia: None. A. Marino: None. M. Patinella: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.03SA/CC36

Topic: J.02. Teaching of Neuroscience

Support: University of Utah Teaching Grant, “Virtual Neurophysiology Workbench”
NIH P41, GM103545, “Center for Integrative Biomedical Computing”
National Science Foundation Graduate Research Fellowship Program Award No.
1747505

Title: Training the next generation of Jedi scientists

Author: *J. A. GEORGE¹, C. R. BUTSON^{1,2,3};
¹Biomed. Engin., ²Scientific Computing and Imaging Inst., ³Neurology, Neurosurg. and
Psychiatry, Univ. of Utah, Salt Lake City, UT

Abstract: The long-term goal of this project is to vertically establish an improved understanding and appreciation of neural engineering in the general public, from K-12 outreach to college-level implementation. Neural engineering is an emerging field of study centered around transferring electromagnetic energy into or out of the nervous system in order to improve our functional understanding or treat neurological disorders. A key component of this multifaceted field is decoding biological signals into interpretable control signals for medical applications. However, understanding this component typically requires expensive equipment and extensive training. These financial and educational barriers limit public knowledge, which in turn limits STEM engagement and advocacy. Leveraging the popularity of Luke Skywalker’s bionic arm, we have developed an inexpensive, hands-on, laboratory exercise that allows individuals to decode their motor intent in order to control a bionic arm with their thoughts. The exercise can be used for STEM outreach for all ages, or as for a college-level introduction to biopotentials and digital signal processing. Two differential-pairs of electromyographic (EMG) data are sampled using inexpensive Arduino-based equipment (Backyard Brains). Signals are filtered (via Arduino or MATLAB) and used to control two degrees-of-freedom on a virtual bionic arm (MuJoCo

HAPTIX). Raw EMG data, filtered control signals, and the bionic arm are visualized in real-time on a windows computer or tablet. This low-cost implementation of a bionic arm enables a variety of captivating educational experiences. Primary educational outcomes for the college-level laboratory exercise include: 1) identifying a patient population in need, 2) understanding how and where to record biological signals, 3) implementing real-time signal processing and control algorithms in Arduino or MATLAB, and 4) designing an experiment to quantify functional improvements. This exercise has been piloted on 40 biomedical engineering students at the University of Utah over the span of two years, receiving increasingly positive feedback. Once completed, the exercise doubles as an outreach project; lay individuals can work together or compete against one another to complete various activities in the virtual environment with their bionic arms. This exercise has been well-received by K-12 students for various outreach initiatives (e.g., science museums, Engineering Day, Brain Awareness Week). In the future, we hope to integrate variations of this exercise into more course curriculums, helping inspire and train the next generation of neural engineers.

Disclosures: J.A. George: None. C.R. Butson: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.04SA/CC37

Topic: J.02. Teaching of Neuroscience

Support: School of Psychology and Neuroscience

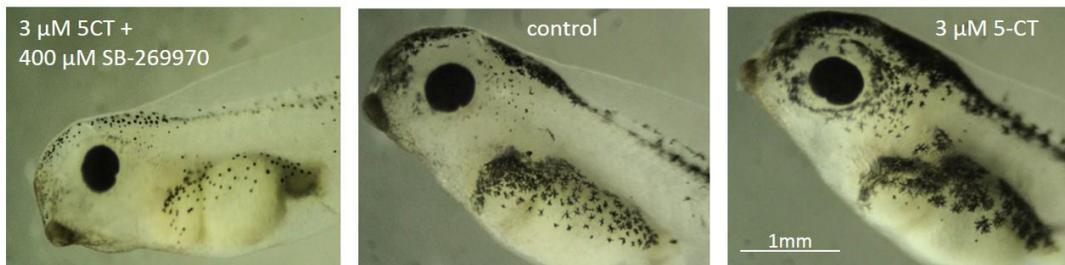
Title: A practical demonstration of pharmacological principles: Modulation of skin melanophore properties in xenopus frog tadpoles by serotonin and nitric oxide

Author: *K. T. SILLAR, F. SORRELL, L. HACHOUMI;

Univ. St Andrews, St Andrews, United Kingdom

Abstract: Melanin dispersion and aggregation in skin melanophores enables animals to adapt their coloration in response to ambient light intensity and background. Melanophores respond to serotonin (5-HT) and nitric oxide (NO). In *Xenopus* melanophore cell lines, NO mediates melanin aggregation (Nilsson et, 2000) and 5-HT, acting on 5-HT7 receptors, mediates melanin dispersion (Teh and Sugden, 2001). Here we show that NO and 5-HT7 receptors trigger the same response in young *Xenopus* tadpoles. This model system can be utilised to illustrate key pharmacological principles such as dose-response curves, pharmacodynamics and modulatory control pathways, to life sciences undergraduate students. *Xenopus laevis* tadpoles are placed into wells of a multi-well polystyrene plate containing dechlorinated water. Under a binocular microscope, the melanophores are easily distinguishable and typically exhibit a range of

expansion states on the Hogben and Slome (H-S) index from fully punctate (1; small dark ovoid) to fully reticulate (5; star shaped). Focussing on the yolk sac area, ≥ 30 melanophores per tadpole in the control well are classified on the 1-5 index. Next, a serial dilution (0.3, 3, 30 and 300 μM) using the non-selective 5-HT7 receptor agonist, 5-Carboxamidotryptamine (5-CT), is performed across four wells. This is repeated with the 5-HT7 receptor antagonist, SB-269971 (400 μM), added to each well. After 1 hour, the melanophores on the treated tadpoles are scored on the H-S index and differences compared using the Kolmogorov-Smirnov cumulative probability test. Dose-response curves are constructed to assess changes caused by the agonist and antagonist. The effects of NO can also be assessed using serial dilutions of the NO donor, DEA/NO (0.1, 1, 10 and 100 μM), and reversing its effects with the NO scavenger, PTIO (100 μM). Drug effects are resistant to fixation, so this exercise can be performed on pre-prepared tadpoles. This exercise can be completed within a 3-hour session. Nilsson et al, (2000) *Cell Mot. Cyt.* 47:209 ; Teh and Sugden, *Br. J. Pharmacol.* (2001) 132, 1799.



Disclosures: K.T. Sillar: None. F. Sorrell: None. L. Hachoumi: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.05SA/CC38

Topic: J.02. Teaching of Neuroscience

Title: Efficient visual neural coding tutorial for grayscale, color, binocular, and video to produce primary visual cortex neural receptive fields

Author: *A. G. GEORGARAS¹, N. URS², P. NOLAN¹, H. SINGH¹, M. V. ALBERT^{1,2};
¹Computer Sci., Loyola Univ. Chicago, Chicago, IL; ²Computer Sci. and Engin., Univ. of North Texas, Denton, TX

Abstract: Early visual processing is known to efficiently encode our natural world. By efficiently encoding natural visual scenes (e.g. rocks, trees, prairie, etc) the derived code resembles the encoding strategy of simple cells in primary visual cortex (V1). This has been used to succinctly explain neural response properties in a variety of visual modalities including black/white, color, binocular, and video (and any arbitrary combination of those). The same efficient coding algorithm can be applied, with only a change in input data. That flexibility is the power of a computational level of understanding sensory systems. We created a self-contained Jupyter notebook using Python that demonstrates the efficient coding principle in a systematic way for the different visual modalities. For each modality, we contrast resulting filters from both natural and non-natural images demonstrating how V1 neural codes are not produced when the images sufficiently deviate from those animals were evolved to process. Similarly, we contrast an efficiency metric which matches constraints and goals of neural processing, such as Independent Components Analysis (ICA), to efficiency metrics that are more popular in general practice, but are not appropriate for most neural coding, such as Principal Components Analysis (PCA). The tutorial works by using pre-selected images and videos and proceeding through the following steps for each visual modality. 1) read in the images or video 2) extract small patches 3) apply an encoding strategy (ICA or PCA), and 4) display a visual tiling of the resulting receptive fields to compare to provided experimentally measured receptive fields. This is done in turn for each visual modality reusing code to emphasize that each modality can be modeled with only a change in inputs. Using this notebook, students without any prior programming experience will be able to follow the steps to generate receptive field models from an efficient coding of natural images in a wide variety of visual modalities including grayscale, color, binocular, and video. Most importantly, this work demonstrates the power of computational principles like efficient coding to a broader audience of neuroscientists.

Disclosures: A.G. Georgaras: None. N. Urs: None. P. Nolan: None. H. Singh: None. M.V. Albert: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.06SA/CC39

Topic: J.02. Teaching of Neuroscience

Title: Using *C. elegans* based lab activities to connect environment, genes, and behavior

Author: *A. J. KALLARACKAL;
Mount St. Mary's Univ., Emmitsburg, MD

Abstract: *C. elegans* are non-parasitic, microscopic nematodes that are easy and inexpensive to maintain compared to most model organisms. They have been used in laboratory settings since the 1970s to study processes ranging from reproduction to aging. Traditionally, these model organisms are used in Biology departments, however they can be very useful for demonstrating topics in common Psychology courses such as Biopsychology and Sensation and Perception. I have designed three different laboratory activities that allow students to explore the relationship between environment/drugs, genes, and behavior as it pertains to various fundamentals of neuroscience. These include 1) an acute drug-induced swimming assay which demonstrates synaptic transmission at the neuromuscular junction, 2) a chronic drug-induced swimming assay which demonstrates synaptic plasticity, and behavioral readouts of tolerance and withdrawal, and 3) a chemotaxis assay which demonstrates the relationship between odorant receptor genes and odorant detection. All three activities were designed to emulate true laboratory experience, with students given a variety of background journal articles to read, and the chance to design their own experiment and hypothesis within a set of parameters (based on available genetic mutants, reagents and microscopy capabilities). Together these activities gave students a unique and engaging way to learn the material as well as experience with experimental design and analysis.

Disclosures: A.J. Kallarackal: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.07SA/CC40

Topic: J.02. Teaching of Neuroscience

Support: NSF 1624104

Title: NeuroCaseNet - Support for teaching neuroscience with cases

Author: L. A. ROESCH¹, P. MARSTELLER², *K. E. FRENZEL¹;
¹Neurosci. and Behavioral Biol. Program, ²Biol., Emory Univ., Atlanta, GA

Abstract: While the neuroscience community is large and organized and there is strong support for neuroscience education within the community, the adoption of case studies and Problem Based Learning (PBL) methods within neuroscience courses is less developed. Finding appropriate teaching resources, perhaps due to the interdisciplinary nature of neuroscience as a discipline, can be difficult. The Neuroscience Case Network (NeuroCaseNet) trains faculty

participants in the use, development and publication of cases for teaching neuroscience and provides collaboration opportunities for educators with a strong interest in using these pedagogies in the classroom. NeuroCaseNet is also a platform for discussion and dissemination of case studies resources for the broader neuroscience education community, e.g. the new 'Case Studies' feature in the Journal of Neuroscience Education (JUNE) and the NeuroCaseNet Facebook page. Here, we illustrate ways faculty can connect with NeuroCaseNet through participation in mentored groups. With a focus on the use of cases, NeuroCaseNet develops and supports a community of engaged educators committed to evidence-based pedagogy.

Disclosures: L.A. Roesch: None. P. Marsteller: None. K.E. Frenzel: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.08SA/CC41

Topic: J.02. Teaching of Neuroscience

Title: Integrating service learning into a neuropsychopharmacology course

Author: *K. M. SEIP-CAMMACK;

Psychology & Neurosci., The Univ. of the South, Sewanee, TN

Abstract: Incorporating service learning (SL) experiences into undergraduate courses can be a meaningful way to engage students and connect course content to the real world (Mead & Kennedy 2012). Neuropsychopharmacology courses are often popular amongst undergraduate students, and it seemed valuable to identify opportunities in that course that would (a) deepen students' understanding of the theoretical issues discussed in the classroom, (b) offer insight into the complexities of studying substance use in the real world, and (c) provide a more comprehensive and nuanced view of the needs/goals of the local community. To attempt to address these goals, I added a laboratory component to my existing Drugs & Behavior course (PSYC350) to support our partnership with a local not-for-profit organization focused on drug education and prevention. Prior to the beginning of the semester, my community partner and I discussed their goals and potential deliverables that my students could produce for them, consistent with the OPERA model of SL (Welch 2010). My PSYC350 students (a) identified peer-reviewed literature and explored existing national/statewide surveys on adolescent substance use, (b) developed hypotheses about subsets of pilot survey data on substance use, collected from local 6-12th grade students, (c) organized/analyzed survey data, (d) produced scientific reports of the data, (e) developed informational materials summarizing the data and related literature, to be distributed by our community partner, and (f) wrote a mock grant proposal incorporating proposed improvements to the survey. Students wrote reflections about their SL experience and took pre-, mid- and post-semester surveys on SL. Findings suggested

that the SL opportunity helped students make connections between course content and the real world, enhanced skills or awareness in ways that added value to the course, challenged them to understand a problem and generate solutions, and expanded their thinking regarding their ability to help tackle substance use-related issues in the community. Students also reported that SL helped them better understand the needs of the community, and strengthened their collaborative skills as a team member and in their interactions with our community partner.

Disclosures: K.M. Seip-Cammack: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.09SA/CC42

Topic: J.02. Teaching of Neuroscience

Title: War and the brain: An exemplar of a liberal arts approach to neuroscience

Author: *K. F. PHILLIPS;

Sch. of Neurosci., Virginia Tech., Blacksburg, VA

Abstract: A liberal arts education prides itself on providing students with broad knowledge across multiple disciplines spanning the sciences and humanities. It also promotes the development of skills in communication and a sense of social responsibility. Although neuroscience programs at the undergraduate level are predominantly found at liberal arts institutions, the average undergraduate neuroscience curriculum prioritizes natural sciences over social sciences. Standard course requirements include courses in biology, chemistry, physics, mathematics, and neuroscience. Furthermore, the neuroscience courses commonly take one perspective within the field such as cognitive neuroscience, cell and molecular neuroscience, or computational neuroscience. Emphasis is regularly placed on scientific inquiry and research skills, but often times the courses fail to apply neuroscience to a broader context. Moreover, many courses lack opportunities for students to ponder ethical considerations and real world applications outside of research. War and the Brain is new and innovative course in the undergraduate neuroscience curriculum at Virginia Tech that teaches neuroscience in the context of history and the military. While neuroscience and the military are not traditionally considered complementary topics, neuroscientific research is at the core of advances in military strategy, defense tactics, and injury treatment. This course takes a true liberal arts approach by weaving ethics, history, and military with neuroscience. Moreover, the neuroscience content itself spans multiple specialties in the field including cognitive neuroscience, cellular neuroscience, neuropharmacology, neurotoxicology, medical neuroscience, and neurotechnology. Major units include cognitive resilience and enhancement, traumatic brain injury, posttraumatic stress disorder, and technological advances. Through the lens of history, students observe the evolution

of major neurological injuries and illnesses and how research in neuroscience has revolutionized the fields of psychiatry and neurology in the last 100 years. In addition, the course emphasizes the development of scientific literacy and written communication skills. A scaffolding approach to primary literature analysis increased student confidence in scientific literature comprehension in 95% of the students. A variety of writing assignments with extensive instructor feedback enhanced writing skills in 91% of the students. Here I will present a detailed overview of the course content, assessment strategies, experiential learning opportunities, and student feedback.

Disclosures: **K.F. Phillips:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.10SA/CC43

Topic: J.02. Teaching of Neuroscience

Title: Sherlock Holmes and the neurophysiologists- The case of the four toxins continues

Author: M. M. STAUFFER, M. SALAZAR R., ***L. B. FRENCH;**
Neurosci., Allegheny Col., Meadville, PA

Abstract: Neurophysiology is challenging for undergraduate students because of the abstract nature of the concepts and the technical difficulty of the laboratory techniques. We have been incorporating a semester-long project into an advanced undergraduate neurophysiology course. The project expands on an activity created by Adler et al. (2006) using a Sherlock Holmes story model. In the original activity, students are given a scenario where multiple people are killed by different toxins. In order to determine which neurotoxins were used to kill the victims of this story, students must collaborate and use their knowledge of neuromuscular synaptic transmission and different electrophysiological approaches to discover the mechanism of action of their mystery toxin. In order to expand on the original idea, we have extended the project to encompass the entire semester and fully integrate it into all aspects of our neurophysiology course. The activities were designed based on active learning pedagogy strategies to maintain students' engagement and to strengthen the connections between the Sherlock Holmes project and the rest of the course. An example of such a pedagogical strategy includes the three-hour class sessions used for the students to design and write their experiment proposals, rather than having the students develop their proposals outside of class. The in-class arrangement allows for ongoing dialogue with the professor to help guide the students in the process of articulating a hypothesis and explaining the appropriate approaches to test it. Other examples of course activities include weekly presentations by students on drugs or toxins that affect synaptic mechanisms being discussed currently in the course, hands-on lab experiences with electrophysiological equipment, and a creative presentation of findings at the conclusion of the

project. We also describe ideas to further improve on the project and course as a whole. The Sherlock Holmes Project increases students' curiosity and improves their ability to work through complex synaptic mechanisms. The increased participation of the students promotes learning in an active and creative manner, allowing them to engage with the material in multiple formats, which supports learning and memory of all the neurophysiology course material.

Disclosures: M.M. Stauffer: None. M. Salazar R.: None. L.B. French: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.11SA/CC44

Topic: J.02. Teaching of Neuroscience

Title: Kinesthetic illusions of limb position and posture

Author: B. SCHILLER¹, W. COLGAN, III³, B. CALDERON⁴, *B. R. JOHNSON²;
¹Office of Undergraduate Biol., ²Neurobio. and Behavior, Cornell Univ., Ithaca, NY; ³Biology, Chem. and Envrn. Sci., Northern New Mexico Col., Espanola, NM; ⁴ADInstruments. Inc, Colorado Springs, CO

Abstract: We are developing a series of student laboratory exercises that address our mental image of physical self. These can be adapted for different student levels, ranging from high school to upper level college classes, depending on the depth of results quantification, conceptual content and the availability of recording instrumentation. This lab exercise illustrates how proprioceptive information from muscle spindles contributes to limb position sense and standing postural maintenance. We use a percussion stimulator to vibrate arm muscle spindles and create kinesthetic illusions. Erroneous messages to the brain that an arm muscle has lengthened creates a distorted image of arm position. Percussive vibrations of muscle spindles in the gastrocnemius muscle disrupt one of the sensory channels contributing to balanced standing posture. Simple qualitative descriptions of limb position and self-reported sense of upright posture balance during muscle spindle stimulation suffice to demonstrate these kinesthetic illusions. Arm position measurements add quantification to arm position illusions. Muscle EMG recordings and Wii balance board measurements of center of pressure during postural balance changes add more quantitative data analysis. These activities encourage further, student-designed exploration. The results of these activities address principles of sensory physiology, central pathways for integration of sensory information, and spinal pathways executing motor commands. In addition, they lead to discussions of how we construct our mental images of physical self, the effects of aging and disease on proprioceptive control of limb position, postural adaptations at sea and upon return to land, and postural illusions experienced by astronauts in space and upon return to Earth.

Disclosures: **B.R. Johnson:** None. **B. Schiller:** None. **W. Colgan:** None. **B. Calderon:** A. Employment/Salary (full or part-time):; ADInstruments, Inc.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.12SA/CC45

Topic: J.02. Teaching of Neuroscience

Support: King's College London

Title: Bridging dimensions in neuroanatomy teaching using plasticine modelling

Author: ***C. KIECKER**¹, R. J. WINGATE²;

¹Neurosci. Educ., King's Col., London, United Kingdom; ²King's Col. London, London, United Kingdom

Abstract: Cadaveric dissection is the method of choice to teach the three-dimensional (3D) architecture of organs and tissues to medical students. This approach is limited for the teaching of brain anatomy due to the relatively small size and less modular arrangement of many neuroanatomical structures. Therefore, this aspect of anatomy education usually relies on projected brains (to teach surface features such as the lobes, gyri and sulci of the cerebral cortex) and on coronal and horizontal brain sections (to teach the arrangement of subcortical structures). Students often struggle to construct a mental image of the spatial relationships of deep (subcortical) brain structures based on the two-dimensional (2D) images that are seen in brain sections and textbooks or generated by clinical neuroimaging techniques. In order to support our medical students' understanding of the 3D arrangement of subcortical brain structures (ventricles, thalamus, basal ganglia, internal capsule), we have introduced plasticine modelling exercises on neuroanatomy workshops. The received feedback suggests that the manual construction of plasticine models facilitates the students' development of 3D mental images of this brain region. Cutting their plasticine models along defined planes relates the 3D models back to the 2D images seen in brain sections, closing a loop of construction/deconstruction that is likely to support a deeper understanding of subcortical brain anatomy.

Disclosures: **C. Kiecker:** None. **R.J. Wingate:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.13SA/CC46

Topic: J.02. Teaching of Neuroscience

Title: Addition of a central handbook on neuroscience, biology, and psychology to college level neurobiology lab

Author: D. XIAO¹, *A. B. BRADFORD²;
¹STEM, ²Neurosci., Regis Col., Weston, MA

Abstract: In 2015, a practical Neurobiology Lab was added to BI306 Neurobiology, a course for college juniors and seniors in the curriculum of Regis College, Weston, MA. Regis College is a Catholic university with 4 schools, Arts and Sciences, Nursing, Health Sciences and Communication/Business, with expanding programs in STEM, psychology, and neuroscience. The BI306 lab class has been taught twice, every other year, and has been adopted as a core laboratory course for neuroscience majors, and as an upper elective for biology majors. Due to high demand, this course will now be run every year. Previously, lab materials have been posted online using the Moodle platform as Microsoft Word or PDF documents. An organized student lab handbook has been written and posted in the middle of the spring 2019 semester to study how laboratory handbook can improve students' learning. This student handbook includes instruction and background materials, including color pictures/diagrams, for individual labs on Neuroanatomy, Neurophysiology, Psychophysiology, Senses, and Reflexes. Example materials from these labs will be demonstrated. Out of 31 students in the class, the evaluations from the students showed the following benefits of having the lab handbook. First, it facilitates students' review and study for exams and preparation of lab reports. Second, it allows the students to preview the lab in an organized way, especially approaching laboratory with conceptual terms and clear objectives, so they will be prepared before the lab. Third, the organized table of contents allows the students to go to any lab session as they'd like so that they will have an overall view of the semester's plan in Neurobiology lab. Lastly, the introduction and the pictures/diagrams helped the students to know the background of all different parts of a lab and practice for the test. Compared to the first half of the semester, the students wished that the handbook was available earlier, so they could practice for the first lab test with the added materials. Student feedback before and after the posting of the handbook will be listed and compared. The Neurobiology student handbook is still under revision based on students' feedback, with added links, materials, and changes for better organization and clarity. Overall, both the addition of organized materials, and the feedback from students improves the teaching of Neurobiology lab. The handbook concept could be applied to our Introduction to Neuroscience course as a means of scaffolding lab organization across core neuroscience courses.

Disclosures: D. Xiao: None. A.B. Bradford: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.14SA/CC47

Topic: J.02. Teaching of Neuroscience

Support: Quinnipiac University

Title: Three laboratory exercises utilizing *Drosophila melanogaster*: Amphetamine-induced larval locomotion, amphetamine-induced conditioned place preference and optogenetic stimulation of behavioral assays

Author: *A. J. BETZ¹, R. BEER¹, A. SPRINGER¹, Z. CULVER¹, J. FELICIANO¹, L. RUSH², K. HIBBARD³;

¹Psychology, ²Biol., Quinnipiac Univ., Hamden, CT; ³Janelia Res. Campus, Ashburn, VA

Abstract: *Drosophila melanogaster* larvae are easily manipulated and can be used to study behavioral and molecular mechanisms comparable to humans. *Drosophila* are an excellent model organism for the undergraduate neuroscience classroom. Pharmacological and optogenetic stimulation are useful tools to illustrate neuroscience principles and enable students to design, collect and analyze high throughput data. Two laboratory exercises in an advanced neuroscience research methods course at Quinnipiac University were conducted to illustrate larval locomotive response to AMPH. First, third-instar larvae were administered saline, 3mM AMPH, or 25mM AMPH and larval locomotion was recorded. It was observed that larvae exposed to 3mM AMPH showed significantly more body wall contractions and distance traveled, while 25mM did not. Secondly, the Conditioned Place Preference (CPP) paradigm was employed to assess the rewarding/aversive associations induced by AMPH. To assess a taxis-based preference of behavior, third-instar larvae were placed on an arena induced with saline and 3mM AMPH on a light/dark arena, exposed to either light or dark conditions. Against the innate behavior of larvae appealing to darkness, it was observed that they spent a higher duration in the light-compartment paired with the 3mM AMPH. Finally, an independent study project optimized behavioral assays using different optogenetic lines of *drosophila*. Genetically encoded tools have been developed to non-invasively activate or silence neurons in freely moving *drosophila*. In the “rolling larvae” line, the larvae respond to thermal or mechanical stimuli by rolling and were controlled by intense light sources. We found motor patterns that changed with genetic strains and wavelength of light. Our results indicate that *Drosophila* larvae and adults can act as useful model in an instructional lab, as they are a reliable animal who are easily manipulated and display drug and optogenetic-induced behaviors.

Disclosures: A.J. Betz: None. R. Beer: None. A. Springer: None. Z. Culver: None. J. Feliciano: None. L. Rush: None. K. Hibbard: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.15SA/CC48

Topic: J.02. Teaching of Neuroscience

Support: Vice-rectory of academics Universidad de los Andes

Title: Use of a practical 3D model for learning sensory-motor tracts in neuroanatomy

Author: *V. AKLE¹, M. C. CHAPARRO¹, M. A. BLANCO¹, J. A. GUTIERREZ²;

¹Sch. of Med., ²Conecta-Te, Univ. de los Andes, Bogota, Colombia

Abstract: Learning the anatomy of the sensory-motor pathways is essential to understanding responses of sensory and motor stimuli through the nervous system, and to interpret cases in a clinical setting. Evidence shows that the use of low-resolution tangible models might enhance the learning process by allowing the students to integrate visual-spatial abilities in their study. Here, we introduce the use of a 3D acrylic model of the spinal cord and brainstem, as an educational tool for learning the anatomical pathways of the sensory-motor tracts. The utility of the model was evaluated by comparing learning outcomes, motivation and self-efficacy in an undergraduate medical anatomy class. Standard mental rotation test (MRT) and self-perception of ability and motivation was also registered.

A translucent-acrylic 3D model was designed and digitized to be laser-cut. It consists of segments representing regions of the spinal cord and brainstem. In each segment, the grey matter is rasterized opaque, and the white matter tracts are outlined and have a slit cut-out, through which students "thread" the colored ribbons representing the ascending and descending tracts (axons). The pathway can be visualized throughout, especially at decussation points.

As previously shown, the male population has a greater ability to rotate objects mentally than the female population, according to their MRT scores ($p < 0.01$). Also, male students perceive themselves as highly skilled in spatial abilities compared to females, who consider themselves as medium low (χ^2 , $p < 0.5$). However, male and female students' self-perception of ability is not correlated with actual MRT scores. On the contrary, students who consider they are "highly" skilled in spatial abilities, have a lower performance in the MRT, in contrast to those who consider they have a poor ability ($p < 0.1$). The use of the 3D model seems to improve motivation and self-efficacy for both sexes ($p < 0.1$); however, preliminary results do not show significant improvement in the knowledge test. Interestingly, more male students in the control group consider they have a "high" spatial ability after studying the topic (χ^2 , $p < 0.5$), which suggest that building the model improves understanding of the competence required to master the subject, while there is no effect for the female students.

The construction of the model for visualization of the tracts is a cost-effective and practical method to supplement learning the sensory-motor pathways. Rigorous evaluation of the model is

needed to demonstrate that using it enhances understanding of the topic, integration and consolidation of information, and development of clinical skills.

Disclosures: V. Akle: None. M.C. Chaparro: None. M.A. Blanco: None. J.A. Gutierrez: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.16SA/CC49

Topic: J.02. Teaching of Neuroscience

Title: Accessible, low cost experiential teaching laboratory techniques to reveal the exquisite properties of the muscle spindle

Author: J. L. RICKERT, *B. L. TRACY;
Hlth. and Exercise Sci., Colorado State Univ., Fort Collins, CO

Abstract: The undergraduate neuromuscular teaching laboratory can be fertile ground for experiential lessons to complement lecture material. Immersive, fun labs engage students and promote better learning. Successfully integrating lecture points and lab concepts from physical, participatory demos can improve student success. We have implemented a collection of highly participatory and effective lab exercises to explore the exquisite features of the muscle spindle. The proprioceptive properties of muscle spindles are an ideal lab topic - their activity can be readily manipulated and the effects visualized and experienced. The anatomical and physiological details can be explored in complementary detail in lecture. This lab is very inexpensive and highly accessible to lab instructors in even resource-challenged environments. The materials required are two vibrating massagers and commonly available goniometers. Here, we present easily implemented experiential, time-tested demonstrations. The Elbow Position-Matching experiment - students match the position of their elbows under No-Vibration and Vibration (elbow extensor) conditions with the eyes closed. Vibration-induced spindle firing in the extensors consistently produces illusory triceps lengthening (illusory elbow flexion) and causes error in the extension direction. Teaching points include spindle sensitivity, central interpretation of spindle firing, and brain perception of muscle length and joint position. The Neurophysiology Trust Fall - bilateral vibration of the Achilles or Tibialis Anterior tendon or unilateral vibration of Peroneus Longus very consistently produces an automatic fall in the direction of vibration. The movement appears to the student to be extra-cognitive and out of voluntary control. Lessons include spindle sensitivity to exquisitely small mechanical disturbance, spindle role in signaling muscle lengthening, central perception of illusory muscle length, cortical and sub-cortical postural control mechanisms, and automatic postural responses to proprioceptive inputs. Where's My Head? - with eyes closed, bilateral vibration of the neck

extensors and unilateral vibration of the sternocleidomastoid muscle produces distinct illusions of head rotation. Lessons include spindle sensitivity, signaling of lengthening, central interpretation of muscle lengthening, proprioceptive sense of head rotation and its importance, and the kinesiology of the neck muscles. These exercises are easy, successful, engaging for students, and have produced consistent positive feedback over 15 years of teaching undergraduate students in our setting.

Disclosures: **B.L. Tracy:** None. **J.L. Rickert:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.17SA/CC50

Topic: J.02. Teaching of Neuroscience

Title: Reproducible quantitative stimulation allows new analysis of crayfish muscle receptor organ responses

Author: ***A. E. AMBROSINI**, A. GELPERIN;
Princeton Neurosci. Inst., Princeton Univ., Princeton, NJ

Abstract: The crustacean muscle receptor organ (MRO) has provided a particularly accessible preparation for the study of sensory coding, and has been widely used in introductory laboratory courses incorporating extracellular recording from sensory nerves in living preparations. We describe three innovations to the standard laboratory exercise using the MRO: (1) a new form of suction electrode to facilitate extracellular recording; (2) a new, Arduino-driven actuator to allow reproducible and quantifiable mechanical stimulation of the MRO; and (3) a new approach to the crayfish abdomen preparation that allows linear extension of the MRO muscles. These novel approaches allow the collection of data sets comprised of sensory cell spike trains under software control as important mechanical stimulus parameters are varied systematically through software. This additional level of user control facilitates a more robust quantitative approach to the analysis of MRO sensory neuron spike trains, which is facilitated by training in the use of platforms such as Matlab and python for this analysis.

Disclosures: **A.E. Ambrosini:** None. **A. Gelperin:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.18SA/CC51

Topic: J.02. Teaching of Neuroscience

Support: TLEF Grant (Univ of Alberta)
Faculty of Science Teaching Grant

Title: The neuromembrane simulator: A format for teaching neuroscience

Author: *D. W. ALI¹, G. D. FUNK³, K. E. JONES²;

¹Biol. Sci., ²Fac Kinesiology, Sport & Rec, Univ. Alberta, Edmonton, AB, Canada; ³Physiol., Fac. of Med. and Dentistry, Univ. of Alberta, Edmonton, AB, Canada

Abstract: Undergraduate students have a difficult time understanding basic neuroscience concepts such as the factors that give rise to the resting membrane potential, the action potential, the direction of ion flow across the membrane and the action of voltage-gated ion channels (Na⁺ and K⁺). Hands-on dynamic simulations are a useful pedagogical tool for overcoming learning barriers. Therefore, we designed and built (in collaboration with a programming company, Atmist Co.) a web-based simulator, called “Neuromembrane” using the Hodgkin Huxley models of ion conductances. The simulator allows students to see ion channel function and ion flow across cell membranes. Our goal was to allow students to alter key parameters of membrane function and make predictions in terms of ion channel activity, ionic currents, membrane potentials and synaptic activity. We wanted the simulator to be free and easily accessible, straightforward to use and easy to understand. In addition, we wanted students to easily upload or download their starting parameters and to print off results as PDF documents (for assignments). It is hosted on the web at the University of Alberta (<https://neuromembrane.ualberta.ca/account/login>) and is highly accessible via a Guest Login button. We wanted students to access the program from the internet via computer, tablet or smartphone and therefore chose not to build the simulator as a platform-specific application, but rather a web-based application. Programming modes include SciPy (open source) + Highcharts (JavaScript, free for educational purposes). Neuromembrane has 8 Simulation Modes: Resting Potential, Action Potential, Voltage Clamp, Voltage Clamp I/V, EPSPs, IPSPs, Integration and Cable Theory Simulation. We are currently improving the functionality of these modes and continuously adding to the program. The Neuromembrane Simulator has been used in classes at the graduate, undergraduate and high school levels. It has aided teaching and pedagogy by allowing students to see ion channel activity and ion flow across the membrane in a visually attractive and it has encouraged discussion and the ability to run thought experiments and make predictions about channel function has greatly aided learning in the classroom.

Disclosures: D.W. Ali: None. G.D. Funk: None. K.E. Jones: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.19SA/CC52

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant 1625104

Title: Brothers in arms: Case study to teach PTSD in introductory neuroscience course

Author: *K. M. WIENS;

Bay Path Univ., Longmeadow, MA

Abstract: The use of stories is one effective technique known to increase memory retention. The Neuroscience Case Network was created to develop new course modules for use in neuroscience classrooms, thereby increasing student engagement and long-term retention of course content. As a fellow within this network, I generated the “Brothers In Arms” case study centered around a news release that relates the story of two brothers who returned from war and suffered from PTSD. Students were required to (a) read a portion of the textbook that explained PTSD, (b) read the news release, and (c) complete seven discussion questions before the class discussion. Students were also asked to generate potential changes to military protocol that might help prevent or better treat PTSD. During class, students were informed that they were Congress, and they were tasked to generate a passable bill that addressed their ideas for changes to military protocol. Students reported that they enjoyed learning about PTSD in this format, gained more knowledge than they would have if it was strictly a lecture format, and that the format caused them to think about PTSD in a unique way. Almost all students recommended that this case study should be used again.

Disclosures: K.M. Wiens: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.20SA/CC53

Topic: J.02. Teaching of Neuroscience

Title: Intersex phenotype and genital-normalizing surgery: Case-based instruction of sexual development and differentiation

Author: *K. L. BLACK;

Tulane Univ., New Orleans, LA

Abstract: There is conclusive evidence supporting the success of case-based instructional methods in STEM disciplines; however, there remains a lack of available Neuroscience-related cases for classroom use. In this controversial, socially-relevant case adapted from a published report (Baumgartner, 2017), students investigate the varied impact of gene expression and hormonal regulation on sexual differentiation in humans. Knowledge of sexual development and differentiation is vital for meaningful understanding of neuroendocrinology. Students read background information from a case regarding an infant born intersex who underwent female genital-normalizing surgery shortly after birth and grew up to identify as male. First, students are required to research different sexual differentiation processes that may lead to an intersex phenotype and hypothesize chromosomal, genetic, and gonadal sex of the infant. Next, students discuss the potential developmental implications of postnatal genital-normalizing surgery. While students are encouraged to pursue ethical and legal considerations, the primary focus is on genetic and hormonal influences of sex differentiation. Finally, students rely on their knowledge of the organizational-activational hypothesis of hormones to debate the developmental impact of hormonal treatment and normalizing surgery across the lifespan. This case allows students to approach a current societal dispute at the scientific level so that they not only can succeed in upper-level endocrinology courses, but they can personally identify the role that neuroscience should, or should not, have in society at large. This case was developed for use in a large, introductory-level neuroscience course for neuroscience and psychology majors. It could be adapted for use in either non-major or upper-level endocrinology courses.

Disclosures: **K.L. Black:** None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.21SA/CC54

Topic: J.02. Teaching of Neuroscience

Support: Independent personal findings only

Title: A flexible interpretation of variance, fuzzy p-values and non-parametric statistics using psychophysical data

Author: ***J. F. GOMEZ-MOLINA**¹, U. M. RICOY², A. L. GOMEZ-MOLINA¹, E. VELÁSQUEZ³, G. PERRY⁴;

¹Intl. Group of Neurosci. (IGN), Medellin, Colombia; ²Biol., Northern New Mexico Col., Espanola, NM; ³Dept. of Psychiatry -Medical Sci., Univ. of Antioquia (Hosp San Vicente de Paul), Medellin, Colombia; ⁴Col. of Sci., Univ. of Texas at San Antonio, San Antonio, TX

Abstract: INTRODUCTION. Intrinsic variability is a factor that play an unpredictable role in neuroscience and its effect is hard to separate from the effect of the treatment in the control/treatment groups . Variance-Between-Treatments/Variance-Within-Treatments is an index of how much of the effect of treatment is caused by the intrinsic variability. The meaning of statistical significance in terms of p , is based on 0,05 (LeBlanc 2004), an arbitrary threshold (it can be reached if many comparisons are made Seife, 2011). The use of hypothesis testing is restricted due to inconsistencies (Monterrey 2012). In this work, we propose to teach students possible solutions with a simple experiment. METHODS. Students are instructed to draw a wave-like curve that they can see and memorize for t seconds (fig 1). Then they receive, one after other, 10 cards where they should try to draw the original figure as precisely as they could. They are allowed to take t' seconds for each card. The cards have an horizontal line over which the figure should be drawn. t, t' , the size of the cards as well as that of the horizontal line can manipulate variability. The lengths of each part of the figure as well as the line are collected as data. DISCUSSION. 1. Is intrinsic variability caused sometimes by unknown rhythmicity? 2. How does reality obey a distribution? 3. Could be p "fuzzy"? CONCLUSIONS. 1. Students with weak quantitative background learn statistics as a magic mechanical procedure in which basic assumptions (normal distributions, fixed parameters) are not criticized. With real cases as the one we described they perceive that these assumptions are weak. 2. p is calculated assuming that H_0 is correct but p can suggest that H_0 can be rejected. This reconfiguration may generate confusion in students. 3. Students can increase the number of comparisons and some of them will obtain a p -value less than 0,05 only because they did a lot of comparisons. 4. Interpretation of 0.05 depends on philosophical assumptions (Fisher vs. Neyman, Bayes vs. frequentists). 5. p can be replaced by a trapezoidal fuzzy number.

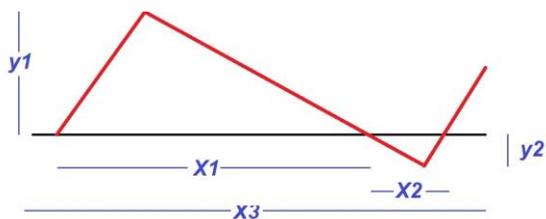


Fig. 1. Proposed figure (red) to show to the students. They should try to reproduce it with the correct proportion when they are presented with the black line only. The length of this line (x_3) can be different to the original so the perception of apparent size can be manipulated and x_3 can be considered as "the treatment".

Discussion with students:

I. About the experiment. Are these values and their hypothesis independent? What statistical method can be applied? Calculate Variance-Between-Treatments/Variance-Within-Treatments.

II. About p-values and 0.05. In what context the value of 0.05 emerge? Is from Fisher, Student, Bayes, parametric, non-parametric? Does it depend on a normal distribution? Can we interpret p-values as continuous indices of the strength of evidence against the null hypothesis?

Disclosures: J.F. Gomez-Molina: None. U.M. Ricoy: None. A.L. Gomez-Molina: None. E. Velásquez: None. G. Perry: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.22SA/CC55

Topic: J.02. Teaching of Neuroscience

Title: Effects of ankle tendon vibration on lean aftereffect

Author: *C. S. LAYNE;

Ctr. for Neuromotor and Biomechanics Res., Univ. of Houston, Houston, TX

Abstract: Previous research has identified deficits in postural adaptation due to inadequate sensory integration to be among the chief reasons for falls. Postural adaptation studies typically involve a change in environmental context to bias or decrease the reliability of the vestibular, visual, and/or proprioceptive systems. Lean after-effect (LAE) studies utilize an incline-intervention (Inc_I), a bout of quiet stance on an inclined surface for several minutes before returning to a flat surface post-test. Most subjects display a forward lean during the post-test which may persist up to several minutes, known as LAE. LAE studies have been used as an effective proprioception-based illusion which leads to global alterations of the body schema and postural adaptation without a coinciding decrease in proprioceptive reliability. Previous LAE experiments have shown that stable, trait weighting of the vestibular and proprioceptive system effects the magnitude and duration of forward lean. This investigation sought to identify the effects of a concurrent proprioceptive illusion, tendon vibration of the Achilles (AT) or tibialis anterior (TA) tendon, on LAE. By adding tendon vibration to an Inc_I or post-test, we were able to identify if changes in state/dynamic sensory weighting affected LAE, and if those changes were directionally specific. Subjects were tasked with performing five bouts of an Inc_I, one baseline condition with no vibration, and bouts with tendon vibration of the AT or TA during the Inc_I or post-test. We compared LAE outcomes between these conditions using integrated area under the curve during the 5-minute post-test. AT vibration during the post-test led to a decrease in LAE. However, this posterior shift was not as great as when subjects were exposed to AT vibration alone, suggesting the Inc_I mediated the effect of tendon vibration. Conversely, TA vibration during the post-test led to an increased LAE compared to the baseline and compared to TA vibration alone, again suggesting the Inc_I served to mediate the effects of tendon vibration. While vibration during the post-test had direction specific effects, when presented with either TA or AT vibration during an Inc_I, subjects had an increase in LAE compared to the baseline. These results show that shank tendon vibration influences the development of LAE if presented concurrently with an Inc_I and moderates the expression of LAE if presented afterwards. This suggests a role of dynamic sensory reweighting as well as an effect of local proprioceptive inputs on the development and expression of LAE.

Disclosures: C.S. Layne: None.

Theme J Poster

022. Exercises and Courses

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 022.23SA/CC56

Topic: J.02. Teaching of Neuroscience

Title: Hands-on, minds-on: A state of the art undergraduate neuroscience laboratory experience

Author: *I. F. KIMBROUGH;

Sch. of Neurosci., Virginia Tech., Blacksburg, VA

Abstract: At Virginia Polytechnic Institute and State University (Virginia Tech/VT), we have established a state of the art undergraduate neuroscience laboratory series to teach the fundamentals of neuroscience with a hands-on, minds-on approach. This flagship course provides VT School of Neuroscience students with an unprecedented opportunity to learn neuroscience concepts and techniques from the perspective of a research experimentalist. Students have access to state-of-the-art research-grade equipment and take part in PhD directed real-world neuroscience research utilizing techniques such as fluorescent microscopy, immunohistochemistry, electrophysiology, optogenetics, and brain-computer interfacing. These courses are designed to provide hands-on experience with a range of experimental strategies, laboratory techniques, and data analysis approaches used in neuroscience research. Lab exercises are chosen to involve students in both theoretical and practical problem solving. Primary goals for the course are to have students think like a neuroscientist and to have students experience the excitement of research. Here we will present a detailed overview of this novel undergraduate teaching platform.

Disclosures: I.F. Kimbrough: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.01SU/CC57

Topic: J.02. Teaching of Neuroscience

Support: W.M. Keck Foundation (GR529005)
National Institutes of Health (R21MH101525; R21EY026427; U01NS099709)
National Science Foundation (CBET-1464686; NeuroNex-1707352)

Title: Application of bioluminescence and neuroscience concepts for AP biology curriculum development

Author: *E. L. CRESPO¹, J. J. ALLEN³, K. R. LITERMAN³, N. C. SHANER⁵, D. LIPSCOMBE⁴, U. HOCHGESCHWENDER², C. I. MOORE³;

¹Central Michigan Univ., Mount Pleasant, MI; ²Neurosci., Central Michigan Univ., Mt Pleasant, MI; ³Neurosci., ⁴Brown Univ., Providence, RI; ⁵UCSD, San Diego, CA

Abstract: Our National Science Foundation NeuroNex Technology Hub: Bioluminescence for Optimal Brain Control and Imaging aims to create novel, genetically-encoded, bioluminescent light sources fused with optogenetic tools for neuroscience research. The conceptual framework underlying our experimental approach is an ideal basis for novel curricula, and in parallel to our research, we aim to educate students of all levels. Bioluminescence is a chemical reaction in which an enzyme, a luciferase, generates light by catalyzing a small molecule, a luciferin. This biological phenomenon is intrinsically captivating and an ideal model to teach integrated biology, chemistry, physics, and neuroscience. We propose a novel curriculum for Advanced Placement (AP) high school biology students where bioluminescence is a recurring, multifaceted theme. Subtopics as diverse as animal behavior (e.g., angler fish using bioluminescent lures), enzyme catalysis (e.g., luciferase catalyzing luciferin to produce light), transcription (e.g., expressing luciferase in mouse models for neuroscience), and the properties of light underwater (e.g., different wavelengths travel different distances) can all be illustrated with bioluminescence. Teachers will have two options for delivery of this curriculum: revisiting bioluminescence periodically during the academic year as students study a variety of topics in preparation for the AP exam, or as a week-long, immersive, capstone experience after the AP exam where students can integrate all they have learned to understand bioluminescence at the molecular, cellular, organismal, and community ecology levels. Throughout the development of this curriculum, we will solicit feedback from AP biology teachers to ensure its utility. Following a pilot in Spring 2020, we will post this curriculum on our website, bioluminescencehub.org, for broad dissemination.

Disclosures: E.L. Crespo: None. J.J. Allen: None. K.R. Literman: None. N.C. Shaner: None. D. Lipscombe: None. U. Hochgeschwender: None. C.I. Moore: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.02SU/CC58

Topic: J.02. Teaching of Neuroscience

Support: PROEX/UNESP

Title: Prevention of abuse and addiction to alcohol and other drugs to adolescents: Diffusion of knowledge through interactive methodologies

Author: *G. MORAIS-SILVA, C. F. LAVERDE, C. DE OLIVEIRA, Jr, C. S. XAVIER, C. T. DEPENTOR, D. M. OGUIURA, G. C. DE SOUZA, L. L. S. MARTINS, L. O. GIATTI, L. T.

DE SANTANA, M. G. SANSÃO, J. A. CAMARGO, M. T. MARIN;
Sch. of Pharmaceut. Sci., Sao Paulo State Univ., Araraquara, Brazil

Abstract: Drug abuse is a serious public health problem and adolescence is the phase of development that the first contacts with drugs of abuse usually take place. Also, drug abuse during adolescence can induce long-lasting impact on drug-related health problems and prevalence of lifetime drug addiction. However, it is difficult to implement educational activities that attract the attention of adolescents. Our research group was previously focused only on basic research of the neurobiology of addiction on School of Pharmaceutical Sciences-São Paulo State University (UNESP) in Araraquara-SP, Brazil. In 2017 other activities orientated to teach aspects of addiction were trained and a booklet of orientations about the interactive activities to be developed with the adolescents was formulated. The interactive activities include games, mini-presentations (15 min maximum) and video and music presentations followed by discussion. The actions were intended to attract adolescent's attention and to pass on current, scientifically grounded and unbiased information. The sequence of activities was applied to adolescents of 7th or 9th grades (12 to 15 years old) by the professor/researcher, graduate, and undergraduate (Pharmacy course) students. All activities were performed in scheduled days during the normal classes of adolescents (4 meetings of 100 min each) in a public school. This project started in 2017, was adjusted based on feedback from adolescents and school teachers and again tested in 2018. In this year the project expanded the number of attended schools, which are indicated by the city local council of drug abuse policies. Nowadays, our group of research and teaching about alcohol and other drugs (PensAD, from Portuguese *Pesquisa e Ensino sobre Álcool e outras Drogas*) tries always to put together research and teaching of themes related to addiction. This combination of expertise areas helps to illustrate the importance of research and its application. Also, it leads to the population surrounding the university a current and scientifically based information.

Disclosures: G. Morais-Silva: None. C.F. Laverde: None. C. de Oliveira: None. C.S. Xavier: None. C.T. Depentor: None. D.M. Oguiura: None. G.C. de Souza: None. L.L.S. Martins: None. L.O. Giatti: None. L.T. de Santana: None. M.G. Sansão: None. J.A. Camargo: None. M.T. Marin: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.03SU/CC59

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant R25 GM129233-03

Title: BrainWaves: An EEG-based neuroscience program

Author: *I. DAVIDESCO, E. LAURENT, S. AZEKA, H. VALK, S. DIKKER, W. SUZUKI;
New York Univ., New York, NY

Abstract: BrainWaves is a high school and college neuroscience curriculum, where students become brain scientists in an original study of their own creation. Students are provided with the content knowledge and practices to design and conduct a neuroscience research study in their own classroom with the use of portable low-cost brainwave measuring devices (electroencephalography (EEG) headsets). The curriculum is accompanied by app that guides students through the process of designing their experiments, as well as collecting and analyzing data. Preliminary evaluation results suggest that students' content knowledge and self-efficacy in conducting research have significantly improved after participating in the program.

Disclosures: I. Davidesco: None. E. Laurent: None. S. Azeka: None. H. Valk: None. S. Dikker: None. W. Suzuki: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.04SU/CC60

Topic: J.02. Teaching of Neuroscience

Support: Arthur Ashe

Title: Research experience in autism for college and high school students, a pipeline program for underrepresented students in medicine and neuroscience

Author: R. CESAR¹, J. ALARCON², A. LOPEZ¹, M. VALMONT⁴, A. DANIELS-OSAZE³, C. BOUTIN-FOSTER³, *J. LIBIEN²;

¹Col. of Med., ²Pathology, ³Office of Diversity Educ. and Res., SUNY Downstate Hlth. Sci. Univ., Brooklyn, NY; ⁴Arthur Ashe Inst. for Urban Hlth., Brooklyn, NY

Abstract: REACH (Research Experience in Autism for College and High School students) is a month-long summer pipeline program for underrepresented students with an aim of attracting students to neuroscience related careers. REACH immerses students in educational and research experiences focused on Autism Spectrum Disorders (ASD). Students work to understand the behavioral, functional, and molecular elements of ASD through a combination of lectures, laboratory experiences, technical training, and clinical observation guided by neuroscientists, neuropathologists, nurses, pediatricians, special education teachers, and child psychiatrists. While the focus is on ASD, students gain research design and laboratory skills necessary for future scientific inquiry. Program participants are separated into groups of 3-4 students headed by neuroscience graduate students or medical students who serve as near-peer mentors. Students

develop their own projects through collaborative hypothesis generation and experimental design and then perform their planned experiments, and collect and analyze the data. They present their data to each other, allowing peer-to-peer mentoring during feedback sessions. Career exploration sessions allow students to learn about career paths in neuroscience and the health sciences as well as health disparities, and the steps needed to enter different careers. After completion of the program, students fill out surveys to gauge any changes in their perceptions and knowledge of ASD and interests in future autism and/or general research. 10 of 12 students that completed the program responded to the survey. Survey responses indicated that students overall had increased interest in pursuing research after the program, with some students hoping to continue with ASD research. Students expressed satisfaction with the research experience for several reasons with an emphasis on mentor facilitated activities and student led project design, with individual interactions with mentors and faculty being a major benefit of a smaller program. Many students indicated they would benefit from additional skills training in laboratory techniques and more educational lectures to further their understanding of ASD. Programs such as REACH which include mentoring in career development, neuroscience education, and clinical and research experiences may be successful in increasing student motivation and success in pursuing careers in neuroscience and medicine.

Disclosures: **R. Cesar:** None. **J. Alarcon:** None. **M. Valmont:** None. **A. Daniels-Osaze:** None. **J. Libien:** None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.05SU/CC61

Topic: J.02. Teaching of Neuroscience

Support: University of Calgary Teaching and Learning Grant

Title: Behavioral neuroscience: An open access approach to education

Author: *S. C. SPANSWICK, J. MONCREIFF, M. C. ANTLE;
Univ. of Calgary, Calgary, AB, Canada

Abstract: The rising cost of educational materials can influence which courses students take, or their decision to purchase required course textbooks. This, combined with prepackaged course materials that may not always align well with course content can hamper student learning. Open access educational resources (OERs) provide a solution to the increasing financial burden experienced by the student population. OERs also allow instructors to modify educational materials, ensuring appropriate alignment with the conceptual framework of a given course, as well as keeping course material current with advances in neuroscience. Here we discuss a

modular OER for a senior-level undergraduate behavioral neuroscience course. Specifically, we developed an online laboratory manual that includes a selection of suggested laboratory activities, each of which includes relevant background information, access to online resources, and clearly defined class learning outcomes. Included with each activity are suggested student assignments and detailed rubrics outlining expectations and assessment approaches. Each laboratory exists independently such that users can select the modules that best align with their course offering. Our laboratory manual has the added benefit of allowing users to suggest/update educational materials, assuring that course content and student assessment techniques remain current with best pedagogical practices. This, in combination with a searchable Digital Object Identifier (DOI) will allow educators across academic institutions to freely access our manual and modify it for their purposes.

Disclosures: S.C. Spanswick: None. J. Moncreiff: None. M.C. Antle: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.06SU/CC62

Topic: J.02. Teaching of Neuroscience

Title: The weight among us: Teaching about obesity from a neuroscience perspective

Author: *G. C. HERRON, A. S. CLARK;

Psychological and Brain Sci., Dartmouth Col., Hanover, NH

Abstract: Obesity is a growing public health concern in the U.S. While there have been many advances in the scientific understanding of obesity, many questions remain unanswered. We sought to develop a course that would examine these different questions about obesity from a neuroscience perspective. The course will be offered as a culminating seminar for junior and senior students studying Neuroscience. In the course, students will learn how the successes and failures in obesity research translate to obesity prevention and clinical treatment. The main topics that will be addressed in the class are as follows: Defining and Measuring Obesity, Brain Pathways in Obesity, and The Effectiveness of Obesity Interventions. Each topic is guided by corresponding questions. The goal is for students to be able to answer these questions by the end of the unit, using evidence from primary research, media sources, and literature.

The class is structured to be highly engaging and collaborative. Students will use the class time to discuss assigned readings and work together to complete different assignments and activities. The in-class assignments encourage students to integrate different concepts learned in the course. They were designed to be applicable to real-life scenarios, such as scientists designing obesity research studies or pharmaceutical companies investigating new obesity therapies. Over the course of the term, students will participate in a community-based “Social Impact” project. This

component of the class will allow students to apply the information they are learning to promote health and obesity prevention within the community. At the end of the course, students will explore their own interest through a final research project. The research project will allow students to investigate an unanswered question about obesity that particularly interests them. Overall, our course titled “The Weight Among Us” is designed to feel applicable to real-life. The goal is for students to walk away with a strong understanding of the current state of obesity and what lies ahead.

Disclosures: G.C. Herron: None. A.S. Clark: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.07SU/CC63

Topic: J.02. Teaching of Neuroscience

Support: Engaged Undergraduate Research Grant, Cornell University

Title: Get to know your brain days: Agency through neuroscience learning

Author: *C. CAMMARATA, K. RATNER, A. BURROW, A. K. ANDERSON, E. D. DE ROSA;
Cornell Univ., Ithaca, NY

Abstract: Schoolchildren are asked to use their brains every day, but rarely taught about the brain, especially not in ways that convey personal agency. We used neuroscience lessons to communicate either growth mindset or purpose in life framing to elementary school children and compared these interventions’ effect on academic achievement. We designed and executed interactive, age-appropriate neuroscience lessons that were delivered during monthly *Get to Know Your Brain Days* at the Syracuse Academy of Sciences, a public charter school serving inner-city children in Syracuse, NY. We delivered lessons to 390 Kindergarten - 4th grade children, divided into three groups: each received the same neuroscience lessons but framing and discussion questions are shaped to emphasize either growth and learning; purpose, goals and identity; or to strictly focus on brain functioning in the control condition. We collected monthly mathematics and English Language Arts test scores to measure academic achievement. Additionally, a short test administered at the end of each lesson assesses students’ engagement with the lesson and tests knowledge of simple facts from that lesson, to determine attention to the material.

Disclosures: C. Cammarata: None. K. Ratner: None. A. Burrow: None. A.K. Anderson: None. E.D. De Rosa: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.08SU/CC64

Topic: J.02. Teaching of Neuroscience

Support: Alpert Medical School Student Group

Title: BrainStation: Elementary school neuroscience

Author: *A. I. MORE¹, J. J. STEIN¹, N. A. STRADA^{1,2}, B. A. PALLANT^{1,2}, A. C. TSUDA¹, J. L. BASSELL^{1,2}, S. T. MERNOFF^{1,2,3};

¹Brown Univ., Providence, RI; ²Alpert Med. Sch., Providence, RI; ³Providence VA Med. Ctr., Providence, RI

Abstract: BrainStation is an interactive, scientific, student-development workshop designed to introduce students to the brain sciences in the earliest years of elementary school. BrainStation's mission is to increase awareness of the brain, mental illness, and neurological disorders systematically by educating children during their early development. The program was started in 2016 and provides free workshops to elementary schools in Rhode Island. BrainStation's first medical school chapter was established in 2018 at Alpert Medical School, and its community outreach is led by medical students, graduate students, and scientist volunteers from Brown University. BrainStation is located in Providence, RI and implements education goals from the Rhode Island Department of Education and Next Generation Science Standards in its curriculum. Since 2016, BrainStation has reached over 25 elementary schools and over 3,000 elementary school students in Rhode Island. This systematic program is an ideal education platform to inspire new students with the possibilities and potentials of brain science. It also provides an opportunity for medical students, graduate students, and scientists to gain valuable teaching experience and interact with the wider community in which it operates. This past year, BrainStation's curriculum has expanded to include after-school programs and community STEM nights in addition to routine classroom visits. In the next year, BrainStation will continue to expand both state-wide and regionally to reach a wider audience in the effort to mentor and educate children systematically in neuroscience-related fields.

Disclosures: A.I. More: None. J.J. Stein: None. N.A. Strada: None. B.A. Pallant: None. A.C. Tsuda: None. J.L. Bassell: None. S.T. Mernoff: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.09SU/CC65

Topic: J.02. Teaching of Neuroscience

Title: K12 students want to learn about neuroscience

Author: *A. M. EISEN, C. M. GRANT-HOWARD, J. BENEFIEL, J. SCHMIDT, M. CHAPEK, M. LERNER, R. GARDUNO, J. URIARTE-LOPEZ, H. HAMILTON, A. KIERSARSKY, L. SUMRALL;
Psychology, Portland State Univ., Portland, OR

Abstract: The Neuroscience Club at Portland State University actively works to enrich local communities with taxpayer-supported neuroscience research. Our members devote their time and effort into bringing education, art, and enthusiasm to our community. A primary focus of our outreach is directed at K-12 public schools, to give students opportunities to interact with science in ways they might not necessarily have had. We base our outreach on open inquiry and tie in elements of philosophy for children. The students have the opportunity to guide their learning, which captures their enthusiasm and engagement for the subject. We have found the students maximize their learning when given the opportunity to ask open-ended questions in a supportive and understanding environment, prompting forth questions filled with both complexity and creativity that could baffle even the most experienced neuroscientists. Students engage the world around them and through the exploration of neuroscience, often draw upon personal experience to connect with others and stimulate thought. Through this process, they can better understand themselves and the world around them. Students use the medium of art to support their understanding of advanced concepts guided by their creativity and physical engagement with the content. Students screen-print works of neuronal art and twist pipe cleaner neurons to life, teaching them ways to engage with science through art while enhancing their understanding of the subject in a hands-on fashion. This poster was inspired by questions collected during an outreach event at North Middle School in Grants Pass, OR. These questions represent common student inquiries from our community outreach events. Although the Neuroscience Club initially focused on students, the club has since expanded its reach to include more diverse populations. The Neuroscience Club's objectives include nourishing the future generation of scientists and artists while allowing education to be fun and engaging and have a place to flourish in diverse communities.

Disclosures: A.M. Eisen: None. C.M. Grant-Howard: None. J. Benefiel: None. J. Schmidt: None. M. Chapek: None. M. Lerner: None. R. Garduno: None. J. Uriarte-Lopez: None. H. Hamilton: None. A. Kiersarsky: None. L. Sumrall: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.10SU/CC66

Topic: J.02. Teaching of Neuroscience

Title: Trainingspace neuroeducation without borders

Author: ***M. B. ABRAMS**, M. SANDSTRÖM, L. JOHANSSON, P. GEORGE;
INCF, Stockholm, Sweden

Abstract: TrainingSpace (TS) is an online hub that aims to make neuroscience educational materials more accessible to the global neuroscience community developed in collaboration with INCF, HBP, SfN, FENS, IBRO, IEEE, BD2K, and iNeuro Initiative. As a hub, TS provides users with access to:

1.

Multimedia educational content from courses, conference lectures, and laboratory exercises from some of the world's leading neuroscience institutes and societies

2.

Study tracks to facilitate self-guided study

3.

Tutorials on tools and open science resources for neuroscience research

4.

A Q&A forum

5.

A neuroscience encyclopedia that provides users with access to over 1.000.000 publicly available datasets as well as links to literature references and scientific abstracts

Topics currently included in TS include: general neuroscience, clinical neuroscience, computational neuroscience, neuroinformatics, computer science, data science, and open science. All courses and conference lectures in TS include a general description, topics covered, links to prerequisite courses if applicable, and links to software described in or required for the course, as well as links to the next lecture in the course or more advanced related courses. In addition to providing resources for students and researchers, TS also provides resources for instructors, such laboratory exercises, open science services, and access to publicly available datasets and models. To learn more about TrainingSpace, see: <https://training.incf.org/>

Disclosures: **M.B. Abrams:** None. **M. Sandström:** None. **L. Johansson:** None. **P. George:** None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.11SU/CC67

Topic: J.02. Teaching of Neuroscience

Support: This work was supported by Washington University and annual Society for Neuroscience chapter grants.

Title: Brain discovery: Impacts of a school-based neuroscience outreach program

Author: *C. T. WEICHSELBAUM, B. V. LANANNA, E. D. HERZOG;
Washington Univ. in St. Louis, St. Louis, MO

Abstract: Brain Discovery is a school-based science outreach program run by graduate students at Washington University in St. Louis. This initiative brings working neuroscientists into local 4th-6th grade classrooms to lead the students in a six-week series of experiments and hands-on activities, allowing them to experience the scientific process while learning about the brain and nervous system. In contrast to many outreach programs that consist of a single event or presentation, Brain Discovery is designed to maximize the benefits of longer-term mentorship while balancing the time constraints of busy volunteers. In addition, we focus on upper elementary students, a critical age at which children are forming beliefs about their interests and capabilities in STEM fields. To measure our impact, assessments of student knowledge and attitudes toward science are collected before and after the program, as well as feedback from teachers, administrators, and participating scientists. As of spring 2019, we have reached over 1200 students across 60+ classrooms, with 40 trained volunteers providing a total of more than 700 teaching hours. Here we present data from the first four years of the program, demonstrating our positive impact on both neuroscience knowledge and attitudes toward science more broadly. Surveys of volunteers and school personnel further suggest a valuable experience for all stakeholders. We present this program as a promising model for other scientists wishing to have a measurable impact on STEM interest in their local communities.

Disclosures: C.T. Weichselbaum: None. B.V. Lananna: None. E.D. Herzog: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.12SU/CC68

Topic: J.02. Teaching of Neuroscience

Title: Brain outreach day as a form of project based learning in an upper level neuroscience elective course

Author: *D. M. CURLIK, II;

Psychology, York Col. of Pennsylvania, York, PA

Abstract: Project-based learning is a valuable tool for improving student interest, engagement, and learning, both in and out of the classroom. In order to implement project-based learning in an upper-level neuroscience elective course, a partnership was formed between York College of Pennsylvania's Psychology Department and Jackson Elementary school, a local Elementary School in York City, Pennsylvania. At the beginning of the academic term, York College undergraduates met with the Site Coordinator for Jackson Elementary, and through this meeting learned about the need for improved science education in Jackson Elementary. As a result of this meeting, students developed a strong interest in facilitating science education in York City schools. In order to accomplish this goal, the York College Undergraduates created and implemented a series of brain awareness outreach activities, designed to teach local 5th-grade students about the interaction of the brain and behavior. Throughout this process, students were divided into groups, with approximately four students per group. Each group submitted distinct proposals for their outreach activity, including the name, topic, learning outcomes, materials, and methods for their project. A proposed topic was chosen for each group, and the groups then worked throughout the term to create lesson plans, rehearse their demonstration lessons, and ultimately deliver engaging and insightful lessons to fifth-grade students from Jackson Elementary. Final outreach activities taught the fifth graders about how the nervous system communicates electrically, how our brain processes and integrates various senses, and how cerebrospinal fluid helps protect the brain from concussion. Following these outreach demonstrations, all students returned to the laboratory space, and York College undergraduates taught the fifth-grade students basic neuroanatomy using sheep brains. The day concluded with a shared meal in the York College cafeteria. Overall, the event was highly successful in meeting myriad learning outcomes for undergraduate psychology majors, as set forth by the American Psychological Association. These goals included developing a working knowledge of core biopsychology domains, exhibiting effective communication skills, enhancing interpersonal relations, and incorporating multiple levels of complexity (cellular, individual, etc.) in order to explain behavior. Moving forward, this outreach will be conducted annually, and opportunities for expanding it through inclusion of additional actives and collaborations are being explored.

Disclosures: D.M. Curlik: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.13SU/CC69

Topic: J.02. Teaching of Neuroscience

Title: Perspectives in mental illness: A course to help freshman engage with complexity

Author: *L. E. STEPANEK;
American Univ., Washington, DC

Abstract: Higher education policy experts and employers claim that many college graduates lack analytical skills, the ability to identify and solve problems, and ethical reflection. To address these concerns, American University began redesigning its core curriculum in 2016. The new curriculum highlights metacognition, engaging with complexity, and valuing diversity. One component of the new curriculum is “Complex Problems”, a required first-year special topics seminar centered in living-learning communities. This poster describes “Perspectives in Mental Illness”, a Complex Problems course that explores not only the scientific basis for mental illness and treatment, but also how cultural, political, and economic forces impact mental health policy. Students read and respond to narratives by those with mental illness, clinical and legal case studies, scientific review articles and congressional testimony. The course takes advantage of the university’s location in Washington DC to invite policy experts as speakers. Students identify their congressional representatives and meet with their staffers on Capitol Hill. Student attainment of learning objectives is measured by several types of formative assessment, as well as a pre-post comparison of answers to the question: “why is mental illness a complex problem?” Students also provide anonymous formative and summative feedback. Students showed gains in considering multiple perspectives and identifying appropriate sources to support their arguments. However, they struggled to identify or engage with diverse perspectives that were not presented in class, and to put texts into conversation with other texts. Participants appreciated visits to Capitol Hill but felt that many other co-curricular activities were an extra burden. Many students preferred hearing individual stories of struggle than expert description of policy issues, and wanted to learn more about causes and treatments of specific mental illnesses. A long-term assessment of student gains would be helpful to determine if this course is serving its purpose.

Disclosures: L.E. Stepanek: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.14SU/CC70

Topic: J.02. Teaching of Neuroscience

Title: Neuroscience at Lake Forest College: A model for student organizations’ contributions to academic experience

Author: *E. MRACKOVA, Y. GANEV, D. SYCHOWSKI, D. BERNINZONI, A. BALARAM, M. KELLEY, S. DEBBURMAN;
Neurosci. Program, Lake Forest Col., Lake Forest, IL

Abstract: As undergraduate neuroscience programs grow nationwide, a common challenge is how dual academic student organizations, one that is an honors society and the other typically older group that is not, can co-exist and thrive to provide co-curricular support. The Neuroscience Program at Lake Forest College was founded in 2009, immediately becoming associated with two such student-led organizations. Synapse, focused on interdisciplinary outreach, was founded first in 2009. The Lake Forest College chapter of Nu Rho Psi, the National Honors Society in Neuroscience, was chartered in 2011. Both quickly gained rapid recognition, on-and off-campus, with Synapse winning the inaugural 2011 National Society for Neuroscience Brain Awareness Week Award and Nu Rho Psi becoming the inaugural 2013 National Chapter-of-the-Year. Though we are distinct, our combined and collaborative goals are to: 1) focus on students' career and professional interest development, 2) raise public awareness on urgent issues of neuroscience, and 3) give back to the community. Towards the first goal, we annually organize two symposia: the first highlighting undergraduate research conducted in faculty labs and the other highlighting capstone experiences in inquiry-driven courses. We also organize an annual academic excursion to the Chicago Chapter Society for Neuroscience meeting. To raise public awareness, Synapse organizes an annual Brain Awareness Week each fall that connects academic work from multiple courses, interdisciplinary lectures, and popular culture including faculty-led movie panels that showcase neurological conditions. Nu Rho Psi holds an annual public seminar series featuring national experts drawing from the Chicago area and beyond. To support younger generations, both organizations conduct K-6 outreach each semester that has already impacted over 500 children. Since 2017, Nu Rho Psi has organized the Chicago Brain Bee (one of the oldest regional bees in the nation). Finally, we work to give back to the community. Our members volunteer at nonprofit organizations that focus on providing services to adults with developmental disabilities. We annually participate in the Chicago Walk to End Alzheimer's, raising over \$4,000 each year. Overall, our combined histories and success as organizations, with focused complementary goals, have positively contributed and strengthened the common mission of the Neuroscience Program and College community that we serve, but not without challenges of collaborative division of organizational responsibilities and the natural ebbs and flows of student leadership, especially in programs that recruit from a smaller pool of students.

Disclosures: E. Mrackova: None. Y. Ganev: None. D. Sychowski: None. D. Berninzoni: None. A. Balaram: None. M. Kelley: None. S. DebBurman: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.15SU/CC71

Topic: J.02. Teaching of Neuroscience

Title: An undergraduate minor in neuroethics: Innovation in neuroscience education

Author: *G. E. HUE, P. R. LENNARD;
NBB, Emory Univ., Atlanta, GA

Abstract: Neuroethics focuses on the ethical, legal, social, and policy implications of advances in neuroscience. Neuroethics is interdisciplinary by nature and the field is driven by a multidisciplinary approach. It treats the ethicality of the advances in the brain sciences, e.g. the BRAIN Initiative, with its commitment to the development of new research tools and technologies, will generate many important ethical questions related to the conduct and use of neuroscience research. Equally relevant in the scholarship of the discipline is the branch y concerned with the neuroscientific research areas that explore matters of ethical import including, but not limited to, how humans make decisions and engage in moral thought. Concerns about neuroethics and the need for its integration into the practice of neuroscience have been recognized at the highest levels of training and research. Here we describe our proposal for an undergraduate minor in Neuroethics in a neuroscience program. Neuroscience and Behavioral Biology (NBB) is an interdisciplinary degree-granting undergraduate program created in 1997 by members of the departments of Anthropology, Biology and Psychology at Emory College of Arts and Sciences (ECAS). Beyond the rigorous four-course core sequence, NBB exposes all majors to the concepts and methodologies of the interdisciplinary field of NBB. The neuroethics minor is an academic innovation that formalizes what many ECAS students have done in recent years, namely being intentional about creating an academic experience that allows them to focus on Neuroethics. In the past our students have designed their curricular experiences with an informal, unrecognized concentration in neuroethics, and have selected from course offerings in NBB, Anthropology, Biology, Human Health, Psychology, Women's, Gender, and Sexuality Studies (WGSS), as well as graduate courses offered through the Master of Arts in Bioethics (MAB) program. The minor proposal draws on existing core courses and electives, but includes novel curricula that leverages available resources and will engage faculty from the College and the Center for Ethics. Neuroethics has been recognized globally and is one of the top priorities for the International Brain Initiative (IBI), a consortium of 7 national-level brain research projects around the globe. Neuroethics education is a top priority within the IBI's neuroethics efforts. Neuroethics is a field born out of neuroscience, thus critical knowledge of neuroscience is needed to engage deeply and practically with neuroethics. The Neuroethics minor, meets the needs of students focused on applied and practical uses of advances in neuroscience.

Disclosures: G.E. Hue: None. P.R. Lennard: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.16SU/CC72

Topic: J.02. Teaching of Neuroscience

Title: A paradigm for integrating neuroscience into small liberal arts colleges

Author: *Q. WANG;

Biol., John Brown Univ., Siloam Springs, AR

Abstract: At John Brown University, a small liberal art college, neuroscience is not offered as a degree track or an established course, except some content about neuroscience in psychology courses. However, a good number of students have shown great enthusiasm about neuroscience: biology, biochemistry, chemistry, nursing, engineering, psychology, arts, film, music and philosophy students. Ideas of neuroscience are presented in student clubs such as Faith United with Science and Engineering (FUSE) and Psi Chi, as well as in students' independent study projects. As a newly recruited faculty member and the only one who specializes in neuroscience, besides the initiation of a research lab and a potentially long-term neurobiology course (currently a selective topic course for biology students), I strive to integrate neuroscience into other vibrantly ongoing disciplines on campus. My current efforts include: (1) Invite faculty members as guest speakers to the neurobiology course to demonstrate how neuroscience is related to their disciplines. (2) Reach out to more student clubs with my own and students' effort of presentations to inspire an interest in neuroscience in the students' own majors. (3) Take advantage of the honor's program, especially a 1-credit honor's seminar where any topic is free to be discussed, offered by selected faculty members. (4) Offer a neuroscience perspective to the integration programs on campus, such as our new Center for Faith and Flourishing. With such effort, my hope is to meet the needs of the students who are interested in neuroscience and increase the awareness of neuroscience in other disciplines, with the advantage of a small liberal art college where many integrated academic activities take place.

Disclosures: Q. Wang: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.17SU/CC73

Topic: J.02. Teaching of Neuroscience

Title: Design of a project-based course that integrates neuroethology with physics of the natural world

Author: *A. C. BASU, T. NARITA;
Col. of the Holy Cross, Worcester, MA

Abstract: Increased integration of physics into life science courses and/or the development of physics courses for life science students are potential long-term means to increase integration of physics and life sciences. We have designed an intermediate-level undergraduate neuroscience course that uses a project-based learning approach to guide integrative thinking in the practice of scientific inquiry. The course will be co-taught by a neuroscientist and a physicist and emphasize inclusive pedagogy in instruction, including a combination of active learning methods. Students will be introduced to the diversity of neural systems underlying natural behaviors and learn basic physics concepts about electricity and magnetism just-in-time to deepen their learning. The first project module will focus on specialized “superpower” senses (*e.g.*, UV and infrared vision, electroreception, and magnetoreception). The second project module will focus on neural circuits governing adaptive behaviors (*e.g.*, specialized feature detection, echolocation, dynamic camouflage, sex-switching). In the third project module, which will be initiated at the beginning of the course and become the main focus for the last unit, students will generate scientific hypotheses, propose experiments using an integrative approach, collect preliminary data to evaluate research directions, and communicate their proposals in oral and written form. The planned theme for this third module is honeybee hive collapse: Student beekeepers on campus maintain a honeybee colony that collapses each winter. Are there seasonal changes in environmental exposures (*e.g.*, temperature, humidity, polarized light) and honey bee behavior, detectable by quantitative analysis, which could account for the annual collapse? What neural systems are implicated? Throughout the course, introductory source materials, seminars on module topics, supplementary mini-lectures, homework exercises, and project feedback will be provided by faculty as needed. The learning objectives are that students will: think integratively, apply knowledge and tools from multiple disciplines to the understanding of complex questions; generate hypotheses to explain natural phenomena; design, carry out, and interpret results of experiments to test hypotheses; and gain proficiency in basic principles of neuroscience, biology, and physics.

Disclosures: A.C. Basu: None. T. Narita: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.18SU/CC74

Topic: J.02. Teaching of Neuroscience

Title: On teaching environmental neuroscience and protection from "dual-use" technology: Toward an inclusive and ethical curriculum

Author: *P. W. TSANG¹, A. LAM², E. L. OHAYON²;

¹Univ. of Toronto, Toronto, ON, Canada; ²The Green Neurosci. Lab., NeuroInx Res. Inst., San Diego, CA

Abstract: While it is widely recognized that the development and adoption of codes of conduct along with education and awareness are important in preventing the misuse of science and technology, the inclusion of environmental and "dual-use" issues in most neuroscience education has been limited or non-existent. In particular, issues relating to the bioethics of "dual-use" are almost entirely absent in postsecondary curricula and other forms of neuroscience research training. There are also many cases where research and findings presented as basic discovery, and/or for human health and peaceful purposes are either funded by military and/or usurped for such applications. Similarly, neuroscience research intended for human health often has the opposite effect with negative environmental consequences. Here we present the need for a novel approach to university-level neuroscience that considers ethical dimensions. We begin by articulating the theoretical bases of such a curriculum in the context of theoretical works in Science, Technology, Society and Environment education (STSE) and Socio-scientific Issues (SSI). We demonstrate how the questions raised relating to "dual-use" technologies spans many dimensions that have immediate application in the laboratory. For example: freedom of inquiry of individual researchers; the importance of open access to methods and findings through conferences and publications; and the importance of knowledge production and scientific advances for the neuroscience discipline and society. These issues raise important questions regarding appropriate guidelines and regulatory mechanisms that can protect researchers, subjects, the integrity of institutions, society at large and the environment. This study also outlines the goals and objectives of an education program including key concepts and principles as well as the application of STSE and SSI pedagogies in generating content, context, rationale and objectives. As such, we outline learning activities and assessment tools that can assist in the development of a critical, ethical and inclusive university-level neuroscience curriculum.

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

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.01SU/CC75

Topic: J.02. Teaching of Neuroscience

Title: Student led recaps and retrieval practice presented as a simple classroom activity emphasizing effective learning strategies

Author: *A. STAVNEZER¹, B. LOM²;

¹Psychology and Neurosci., Col. of Wooster, Wooster, OH; ²Biol. and Neurosci., Davidson Col., Davidson, NC

Abstract: To prepare the next generation of scientists for the challenges ahead, it is imperative that college and university faculty continue to collaborate to develop and assess innovative teaching methods that effectively encourage learning for all undergraduates, particularly in STEM. As part of such efforts we have developed a simple student-led classroom technique, recap and retrieval practice (R&RP). We collaboratively implemented R&RPs in three upper-level STEM courses, each with significant neuroscience content, at two institutions. R&RP sessions are short (5-10 minute), in-class, student-led reviews of course material from previous class sessions. As such, R&RPs feature student voices prominently at the start of every class period to review prior course material in active ways. In each R&RP session a duo or trio of students prepares and then delivers a recap of prior course content to their classmates via active, low-stakes retrieval practice formats such as quizzes and games, which are well known to be particularly effective learning tools. These R&RP assignments are also designed to emphasize student use of additional evidence-based practices (concrete examples, dual coding, elaboration, interleaving, and spaced practice) also demonstrated to be successful learning strategies. Our assessment of student experiences both in leading and participating in R&RPs, as well as their knowledge of learning strategies, indicates that R&RP sessions were well-received, active learning strategies that our students indicated they appreciated and found helpful to their learning. Ninety-five percent of the students reported that leading a R&RP (which they did at least twice) helped them learn the material, and 82% reported that their learning was improved when they were audience members. Importantly, students felt they owned the responsibility for R&RP, strongly preferring the option of student-led over instructor-led R&RPs. As instructors, we found R&RPs to be an efficient strategy that effectively encouraged class participation by all students, allowed us to assess class participation objectively, introduced students to evidence-based learning strategies, and most importantly emphasized student voices at the start of every class session. Moreover, we experienced that collaboratively deploying a learning activity allowed us to observe the impact of a specific pedagogical activity in varied instructional settings and enhanced our professional development as educators. Our data will demonstrate that student-led R&RP are a simple, flexible, and easily implemented small teaching strategy that powerfully engages students in their learning.

Disclosures: A. Stavnezer: None. B. Lom: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.02SU/CC76

Topic: J.02. Teaching of Neuroscience

Support: JMU Department of Biology

Title: Backward design of a writing-intensive and primary literature-based neurotechniques course at the undergraduate/master's level

Author: *G. S. VIDAL;

James Madison Univ., Harrisonburg, VA

Abstract: A new course entitled “Understanding Techniques in Neuroscience” was taught at James Madison University as a 400/500-level biology/neuroscience elective. An overarching goal for undergraduate STEM education is to provide students with a solid foundation in scientific literacy, including analyzing primary literature, developing appropriate hypotheses, communicating science to varied audiences, and understanding the social structures involved in the conception, production, and dissemination of scientific data. Thus, the selection of content for this neuroscience techniques course stemmed from a desire to improve student outcomes in these forms of scientific literacy and communication. The course was open to all undergraduate and master's students at James Madison University who had completed basic biology coursework, though the class roster comprised mostly junior and senior biology majors. The content of the course was aligned to a series of student learning objectives defined by the various techniques tying together various neuroscience subfields (e.g. whole brain imaging, behavioral assessments, manipulation of neural activity). This alignment of class activities to course objectives utilized the principle of “backward design”. As a result, most classroom time was devoted to in-depth discussion of primary literature as well as grant writing exercises that mimicked NIH requirements and review practices while providing a broad area for student creativity. Students became responsible for understanding techniques in neuroscience to a level at which they could design a series of experiments that would address a human health topic. Results show that students gained significant skills in scientific design and written communication, and improved attitudes and confidence toward scientific primary literature and scientific writing.

Disclosures: G.S. Vidal: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.03SU/CC77

Topic: J.02. Teaching of Neuroscience

Support: Grass Foundation Educational Outreach Grant

Alford Center for Service Learning, Denison University

Title: Curricular service learning in neuroscience produces positive outcomes for students and community members

Author: *H. J. RHODES;

Biol. and Neurosci., Denison Univ., Granville, OH

Abstract: Curricular service learning and project-based learning approaches are increasingly popular pedagogical tools to engage students in deep and applied learning. These approaches are often successful at motivating students and developing a range of skills, including communication, collaboration, and problem solving. When based in the community, they also provide scientific outreach to a broader audience. With those goals and potential benefits in mind, undergraduate biology and neuroscience students at Denison University were assigned to develop neuroscience curricula and lab exercises using low-cost electrophysiology tools from Backyard Brains. The undergraduates then trained and supported secondary level teachers to use the Backyard Brains equipment and supplied curriculum for their classrooms, to be used at the time of the projects as well as in the future. The undergraduates worked with educators in two locations: remotely at the Maths & Science Leadership Academy (MSLA) in Kimberley, South Africa, and locally at Newark High School in Newark, Ohio. Undergraduates reported that the outreach project was moderately helpful in mastering course concepts in neurophysiology and very helpful in improving communication skills, confidence, and allowing students to pursue their interests. Some students also reported increased motivation and better quality collaboration than on typical group assignments. Secondary teachers and students who received outreach also reported a high degree of satisfaction with the project. The high school students enjoyed the hands on activities, were excited by the subject matter, and reported a desire to learn more about neuroscience. In the first year, over 300 students and teachers were involved in the project, making this a cost effective outreach effort (total budget was ~\$3000). Participants are currently being surveyed about the continued impacts of the project during the second year, these longer-term outcomes will be also be reported.

Disclosures: H.J. Rhodes: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.04SU/CC78

Topic: J.02. Teaching of Neuroscience

Title: Impulse allows undergraduates to experience neuroscience publishing from submission through manuscript publication

Author: *C. T. FENNELL, E. B. TURNER, C. H. GODFREY, A. N. TOLLEFSRUD, L. S. JONES, M. C. ZRULL;
Appalachian State Univ., Boone, NC

Abstract: Last year, *IMPULSE - The Premier Undergraduate Neuroscience Journal* was 16 years old. The journal was created in 2003 to allow undergraduates to take an active role in writing and reviewing scientific manuscripts for publication, and it continues to offer undergraduates the same opportunity today. While many undergraduate curricula allow students to gain experience conducting research, writing meeting submissions, producing and presenting posters, and giving talks, many students do not gain experience in the journal submission process until they reach graduate or professional education. *IMPULSE* provides a venue for students to gain extensive experience writing, interacting with journal editors, and doing manuscript revisions during their undergraduate education. *IMPULSE* is an open-access journal indexed within the Directory of Open Access Journals, and authors who submit to *IMPULSE* retain ownership of their manuscript after publication. *IMPULSE* not only allows undergraduates an outlet for publishing their research but offers an enriching experience in peer revision as well. The journal is supported by a peer review process, which is performed by over 100 students across 37 institutions throughout the world and is facilitated through a series of training modules provided on the *IMPULSE* website and a Faculty Advisor (FA). Groups of students at a particular institution meet together to discuss their reviews of submissions with guidance from an FA. These institutions are referred to as Review Training Sites (RTSs). Undergraduates who wish to review for *IMPULSE* but are not at an institution with a review site are assigned to a RTS and work electronically. Each RTS selects an Associate Editor who has the responsibility to compile individual reviews into a single review for the RTS and submit it to the Executive Editor, who is an undergraduate, on the *IMPULSE* editorial board. The Executive Editor compiles RTS reviews into a single document of comments and necessary and suggested edits, which is sent back to the manuscript author(s). Since January 2018, *IMPULSE* has published 11 research papers on various topics in neuroscience, and 44 research articles and 10 review papers have been published over the last 5 years. *IMPULSE* allows undergraduates to become familiar with the process of scientific publishing early in their educational careers. Including *IMPULSE* in undergraduate curricula provides opportunity to effectively prepare students for success in graduate and professional education by allowing practice and development of writing skills as well as an introduction to the process of submitting neuroscience literature to a scientific journal.

Disclosures: C.T. Fennell: None. E.B. Turner: None. C.H. Godfrey: None. A.N. Tollefsrud: None. L.S. Jones: None. M.C. Zrull: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.05SU/DD1

Topic: J.02. Teaching of Neuroscience

Title: Benefits of collaborative learning in undergraduate neuroscience education

Author: *T. NEWPHER, M. NG;
Psychology and Neurosci., Duke Univ., Durham, NC

Abstract: Collaborative learning is an evidence-based instructional strategy that facilitates rich discussions between students to deepen student engagement and learning. This pedagogical approach increases learning gains and reduces failure rates among undergraduate students in STEM courses. In addition, student participation, motivation, and self-efficacy can all be increased with these structured learning environments. One such structured, active learning environment is Team-Based Learning (TBL). In TBL, students spend the majority of classroom time applying course content, analyzing data, synthesizing new ideas, and evaluating hypotheses. Importantly, previous studies have shown that learning outcomes and student course satisfaction are higher in courses that use TBL, compared to lecture-based classrooms. To better understand how TBL improves student learning and course satisfaction, we collected end of semester course evaluations and measured student-perceived classroom dynamics, as well as learning of lower and higher order levels of Bloom's taxonomy. Our results suggest that implementation of TBL in an undergraduate neuroscience classroom improves student-perceived learning in both lower order (gaining knowledge, understanding concepts) and higher order (learning to apply and synthesize) levels of Bloom's taxonomy. These increases are consistent with the strong emphasis placed on application and synthesis within a TBL classroom.

Disclosures: T. Newpher: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.06SU/DD2

Topic: J.02. Teaching of Neuroscience

Support: Career Ready Fund (CRF)
Advancing Teaching & Learning in Arts & Science (ATLAS)

Title: The Human Biology Program's 'Lab Bootcamp': An experiential learning program for independent undergraduate research at the University of Toronto

Author: J. SINGH¹, A. H. M. WONG¹, K. SHAHABI¹, L. F. ZHAO¹, M. A. WOODIN², *C. DOCKSTADER¹;

¹Human Biol. Program, ²Cell & Systems Biol., Univ. of Toronto, Toronto, ON, Canada

Abstract: Approximately half of Ontario undergraduate life science students do not experience a work-integrated learning opportunity before they complete their studies. Recent graduates and their new supervisors often report that students are not adequately prepared to work in a research setting. The Human Biology Program (HMB) at The University of Toronto designed and conducted a two-week intensive experiential learning program, called 'Lab Bootcamp', for life science undergraduates in May 2018 (n=22) and May 2019 (n=54). The Bootcamp reflected the experience of an independent project in a molecular biology research setting. Small students groups (~4 students/group), each mentored by a senior graduate student, were challenged to research and develop an optimal experimental strategy for directly addressing a research objective given to them. They were told to consider the sensitivity of their strategy, time required to perform it, and limitations of their approach. Students began each day with a director-led discussion regarding agenda and goal setting, and ended each day with a student-led discussion of key results and experimental troubleshooting. In addition to wet-lab procedures, students participated in workshops in biosafety, data analysis, research ethics, biotechnology, and resume/CV building. At the end of two weeks students presented the culmination of their work in group-based oral presentations. Course surveys immediately following Bootcamp, as well as at a 4-month follow-up, indicated that students found that their technical and critical-thinking skills substantially increased, as did their communicative and collaborative skills. Unexpectedly, students rated an increased confidence in conducting research the highest of all indices evaluated. Following Bootcamp 2018, 2 of 4 graduating students went on to continue in research. For 18 students entering their final undergraduate year, 7 students were hired in work-study positions and 5 conducted independent research projects. Bootcamp 2019 data from 54 students will be evaluated soon. We conclude that the HMB Lab Bootcamp format offered life science undergraduates an effective experiential learning environment by empowering students to acquire skills and confidence in an inquiry-based research setting.

Disclosures: **J. Singh:** None. **A.H.M. Wong:** None. **K. Shahabi:** None. **L.F. Zhao:** None. **M.A. Woodin:** None. **C. Dockstader:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.07SU/DD3

Topic: J.02. Teaching of Neuroscience

Support: Medical Faculty Tuebingen (PROFIL program)

Title: Audience response systems and other modern teaching methods to improve student learning and perception

Author: *T. SCHMIDT¹, K. SCHNABEL², U. MAU-HOLZMANN¹;

¹Med. Genetics, Univ. of Tuebingen, Tuebingen, Germany; ²Dept. for Educ. and Media (AUM), Univ. of Bern, Bern, Switzerland

Abstract: Major parts of University or College education is still given in form of classical teacher-oriented lectures. However, from a learning-physiological point of view, this form of instruction is inefficient, as without repetitions, students will forget more than half of what they have just learned within minutes. Another aspect contributing to this issue is that students usually behave passively while listening to lectures. An active or even interactive mode of engagement is typically not achieved in classical lectures. In order to counteract this dilemma, we have integrated modern teaching methods such as audience response systems and an inverted or flipped classroom into our classes in Neurogenetics and related fields. We evaluated the implementation using a 6-point Likert Scale survey: We asked the students for their previous experience with these methods and for their impression regarding motivation, engagement and perception.

Most students did not yet know these modern teaching methods from other courses, but assessed their use very positively and would prefer their integration into additional courses as well. They had no technical difficulties using these teaching methods and felt stronger engaged and better motivated to deal with the respective topics. We were pleased how well these modern teaching methods were accepted by the students.

However, a better motivation, an increase engagement or higher satisfaction with the classes do not necessarily mean that the applied teaching methods improve the student's learning and perception. In order to assess this point, we further analyzed the student's performance in summative assessments regarding the use of modern teaching methods like audience response systems and inverted / flipped classroom in their classes.

Our results will help us understanding both the relevance and impact of modern teaching methods like audience response systems and inverted or flipped classroom approaches.

Disclosures: T. Schmidt: None. U. Mau-Holzmann: None. K. Schnabel: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.08SU/DD4

Topic: J.02. Teaching of Neuroscience

Title: Students' perception about their teaching-learning process in neurophysiology after the use of a game as a ludic practice

Author: *L. P. GUTIERREZ¹, A. F. GUIMARÃES², C. S. MARTINS², A. G. P. NUNES², M. PORAWSKI³;

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Abstract: Background: Ludic practices are important in education, because through the fun it is possible to develop skills and make conditions of knowledge construction, introducing pleasure, motivation, initiative and creativity. Thus, the Neurophysiology game is a board game that was developed by this group and it is used to support the understanding of theoretical classes.

Objective: The aim of this study was introduce ludic practices in the teaching of Neurophysiology in health courses and to evaluate the students' perception in their teaching-learning process. Methods: The data were collected from an exploratory survey using convenience sampling (students who accepted to participate voluntarily), after completing the Neurophysiology module (which occurred from February to April 2019), in the Physiology disciplines of the Pharmacy, Medical Chemistry and Medical Physics courses of Federal University of Health Sciences of Porto Alegre (Brazil). As a supplement to the traditional lecture-based class, the students experienced the Neurophysiology game that consisted of a paperboard, dice and paper cards with questions about the central, peripheral and neurovegetative nervous system. Students were divided into groups and the game took place for 60 minutes, reviewing content and solving doubts in an interactive and dynamic way. The students threw the dice and answered questions about Neurophysiology, advancing on the board according to their correctly answering. The first group to complete the board was the winner. After this, a questionnaire was applied with closed questions to evaluate the students' perception regarding the use of LP in learning. The data obtained were organized in Excel® (version 2010), described in absolute frequency and percentages. This research was approved by the Research Ethics Committee (CAE 82851518.3.0000.5345). Results: The sample consisted of 53 students. Preliminary data shows that 93,2% of the students judged that the use of Neurophysiology game were great or very good and 3,8% of the students found that practice to be good. Few students reported discomfort and diffidence feelings when the activity was proposed (5,6%). Most students (69,8%) preferred ludic activities than lecture-based classes, 22, 7% of students said they learn equally well with both methodologies and 7,5% of students said they learn best with lecture-based classes. Conclusion: These positive results express the value of using ludic practices as an additional tool in combination with the theoretical lecture-based classes for the study of the Neurophysiology. Finally, because of it low cost for elaboration, this game can be used in developing countries.

Disclosures: L.P. Gutierrez: None. A.F. Guimarães: None. C.S. Martins: None. A.G.P. Nunes: None. M. Porawski: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.09SU/DD5

Topic: J.02. Teaching of Neuroscience

Title: Active learning adoption in a traditional lecture-based motor control course

Author: *M. WILSON¹, Z. A. RILEY²;

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Abstract: Lecture-based teaching methods have been used at the collegiate level for years. Although this style has been effective, research has shown that it is falling short for the present and future generations of students. The rise of technology, as well as the increase demand for academic performance, has led educators to shift from lecture-based teaching to student-centered learning experiences or “active learning” (DeWitt, 2019). Active learning is a method of teaching that engages students to apply, analyze, and evaluate the material they have been given, thereby improving outcomes. In this study we implemented an active learning module into an undergraduate, senior-level motor control course at IUPUI. To do this, we incorporated four discussion board assignments via Canvas (a reporting system for students grades that allows for professor/student and student/student discussion and social networking). 46 students were divided into groups of 3-4 students and were asked to produce 500-word essays on topics that were being covered in each unit throughout the course. In addition to the essays uploaded to the discussion boards, students were required to produce 3 comments on each discussion board topic to generate discussion. Notecards were also implemented and given on the first day of class and the last day of class to assess the students learning styles, as well as if they felt that the incorporated active learning enhanced their overall learning experience. We used course grade averages from the previous semester (lecture-based) to compare to the semester that had active learning. We found that there was no significant difference between class average GPA’s for the two semesters recorded. However, the notecard review showed that 30 of the 36 students believed their overall learning experience improved with the use of discussion boards. We would need many semesters of empirical data to determine if the implementation of active learning is impacting GPA, though the feedback from the students leads us to believe this is a promising step in the right direction, with minimal impact on teaching delivering time and resources.

Disclosures: M. Wilson: None. Z.A. Riley: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.10SU/DD6

Topic: J.02. Teaching of Neuroscience

Support: UCLA Center for the Advancement of Teaching Grant #18-08

Title: N.E.U.R.O. test v. 2.0: Assessing an entire neuroscience curriculum for learning gains

Author: *W. E. GRISHAM¹, H. WHANG², W. E. BABIEC³, N. SCHOTTLER¹, M. LEVIS-FITZGERALD²;

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Abstract: Most tests of learning gains assess a single aspect of a course or just a single course. The N.E.U.R.O.—Neuroscience Evaluation of Undergraduate Realized Outcomes test, in contrast, is being developed to assess an entire Neuroscience Major at UCLA and the learning gains achieved as students traverse the curriculum. With version 1.0, we established that we had a test with high reliability that showed differences between first year students and fourth year students, and that the test predicted grades in the major when examined retrospectively. The test is now a 45 question, 5-item per question, multiple choice test plus one open ended question. Questions covered neuroanatomy, neurophysiology, cognitive neuroscience, developmental neuroscience, molecular neuroscience, neuropharmacology, and statistics/data interpretation. Some of the test is based on the Neuroscience Pre Test, with some modification by UCLA faculty. Version 2.0 sought and incorporated further faculty input, and also brought the items into better alignment with the UCLA Neuroscience program goals and expected learning outcomes.

With version 2.0 our goals were to 1) expand the number of items, which should increase the reliability of the test, 2) Revise items from version 1.0 for wording and comprehension, 3) See if differences due to students' experience with the curriculum were maintained 4) See if version 2.0 can detect changes in learning gains due to a single course, 5) Check the validity of revised test for predicting performance within and across courses.

Expanding the test item number from 31 to 45 increased reliability from a Cronbach $\alpha = 0.720$ to 0.804 and 0.844 on the pretest and posttest, respectively. Posttest scores significantly correlated with grades once the course was completed (range 0.461-0.603).

Advanced students scored better than first year students, showing that experience with the curriculum increases test scores. Pre- and posttest scores were significantly different in three of the four classes, showing that the test is sensitive enough to detect learning gains in a single course.

N.E.U.R.O. v.2.0 shows great promise for to be used to evaluate an entire curriculum. Its sensitivity in differentiating students due to experience suggests that it truly is measuring learning gains. Thus, it can be diagnostic for examining the efficacy of individual courses or the curriculum as a whole. Further, scores on this test can be disaggregated to ascertain if the curriculum is serving students equally across all demographics.

Disclosures: W.E. Grisham: None. H. Whang: None. W.E. Babiec: None. N. Schottler: None. M. Levis-Fitzgerald: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.11SU/DD7

Topic: J.02. Teaching of Neuroscience

Support: IBRO Global Advocacy Grant
United States Department of State S-BL400-17-IN0055
United States Department of State S-BL400-16-IN0017
United States Department of State S-BL400-15-G102
United States Department of State S-BL400-18-IN0037

Title: Effective participatory science education in a diverse Latin American population

Author: ***M. A. MOSTAJO-RADJI**, L. M. R. FERREIRA, G. A. CAROSSO, B. LOPEZ-VIDELA, N. MONTELLANO DURAN, S. BOHORQUEZ-MASSUD, G. VACA DIEZ, L. RIVERA-BETANCOURT, Y. RODRIGUEZ, D. G. ORDONEZ, D. K. ALATRISTE-GONZALEZ, A. VACAFLORES, L. GONZALEZ AUZA, C. SCHUETZ, L. E. ALVARADO-ARNEZ, C. V. ALEXANDER-SAVINO, O. GANDARILLA CUELLAR;
Clubes de Ciencia Bolivia Fndn., Santa Cruz, Bolivia, Plurinational State of

Abstract: Particular challenges exist for science education in the developing world, where limited resources require curricula designed to balance state-of-the-art knowledge with practical and political considerations in region-specific contexts. Project-based biology teaching is especially difficult to execute due to high infrastructural costs and limited teacher training. Here, we report our results implementing short, challenging, and low-cost biology courses to high school and college students in Bolivia, designed and taught in collaboration between scientists from developed nations and local science instructors. We find our approach to be effective at transmitting advanced topics in disease modeling, microscopy, genome engineering, neuroscience, microbiology, and regenerative biology. We find that student learning through this approach was not significantly affected by their background, education level, socioeconomic status, or initial interest in the course. Moreover, participants reported a heightened interest in pursuing scientific careers after course completion. These results demonstrate efficacy of participatory learning in a developing nation, and suggest that similar techniques could drive scientific engagement in other developing economies.

Disclosures: **M.A. Mostajo-Radji:** None. **L.M.R. Ferreira:** None. **G.A. Carosso:** None. **B. Lopez-Videla:** None. **N. Montellano Duran:** None. **S. Bohorquez-Massud:** None. **G. Vaca Diez:** None. **L. Rivera-Betancourt:** None. **Y. Rodriguez:** None. **D.G. Ordonez:** None. **D.K. Alatrisme-Gonzalez:** None. **A. Vacaflores:** None. **L. Gonzalez Auza:** None. **C. Schuetz:** None. **L.E. Alvarado-Arnez:** None. **C.V. Alexander-Savino:** None. **O. Gandarilla Cuellar:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.12SU/DD8

Topic: J.02. Teaching of Neuroscience

Support: JHU/APL Internal Research and Development

Title: A cohort-based integrated research community for undergraduate leadership, innovation and trailblazing

Author: M. CERVANTES, M. VILLAFANE-DELGADO, E. C. JOHNSON, M. HUGHES, K. GRAY-RONCAL, M. ENCARNACIÓN, *W. R. GRAY-RONCAL;
Applied Physics Lab., Johns Hopkins Univ., Laurel, MD

Abstract: We target trailblazing, high-achieving students who are facing barriers in accomplishing their goals of becoming research leaders in STEM fields such as computational neuroscience. Examples include those from underserved backgrounds (e.g., first-generation, low-income), underrepresented backgrounds (e.g., African American and Hispanic students, women), and others with limited exposure to research opportunities or mentoring. These students are often missed in traditional recruitment pipelines, and are at a higher risk of not persisting in research careers. We recruit holistically, including students from all backgrounds, and select students based on their commitment, potential, and need.

It is widely-acknowledged that students from trailblazing backgrounds face many barriers in achieving career success, and attrition is seen throughout the STEM pipeline, making it especially challenging for companies to effectively recruit students at a rate proportional to their prevalence in the broader population. The challenges that trailblazers face are multi-factorial, including knowledge, financial limitations, access to mentors, implicit bias, awareness, confidence, and limited networks. We provide an infusion of resources, confidence, and knowledge that catalyzes their efforts. We help students to succeed and to become leaders - to redirect their substantial potential and work ethic toward cutting-edge scientific challenges and future career success. We provide an inclusive environment - a presumption of belonging and the associated support - that is often unavailable to trailblazing students.

Critically, we combine intensive outreach, training, and mentoring support of our students with immersion in cutting-edge research problems, with a focus on applied neuroscience, precision medicine, and artificial intelligence applications. Students begin with structured activities, progressing to cohort-based independent research and discovery, as part of a team consisting of professional staff at diverse levels (i.e., new hires and subject matter experts). Their work typically culminates in a peer-reviewed conference or journal publication. Students are supported by professional staff, as well as a rich variety of instructional activities (e.g., recent courses included neuroscience, graph theory, machine learning, robotics, and data science). Now in our third session, we will highlight mission and student training successes from the first two program

sessions in applied neuroscience and explain how this model can generalize to additional domains and be expanded to additional student cohorts.

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Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.13SU/DD9

Topic: J.02. Teaching of Neuroscience

Title: Teaching to the outliers in biopsychology: Remediation techniques when a class fails

Author: *S. C. PENLEY;

Psychology, Bridgewater State Univ., Bridgewater, MA

Abstract: In statistics, the sampling distribution of the mean is a theoretical frequency distribution of sample means for all possible random samples of a given size. In theory the mean of the sampling distribution should equal the population mean, but some sample means will be greater, some less. There is variability in our measured means. This can often be observed in the semester-to-semester variation of class performance and occasionally as educators we can experience an outlier, an extreme example of this variation. I reflected on the idea of variation in group performance after the observation that one section of Biopsychology performed significantly worse on the first exam (between 15.5% and 24% points lower) on when compared to both previous and concurrent classes ($F(8,214)=4.012$, $p<.001$, post hoc all $p's<.01$) This led me to the questions: What do you do if a class/sample is an outlier? What do you do if a whole class fails? Using archival data from nine biopsychology classes matched on content, and assessment techniques, variation of average performance across multiple samples was examined. These outcomes were compared across previous iterations of this class to confirm baseline expectations for performance. Specifically, the purpose of this project was to reflect on the relationship between average performances in matched classes that exhibit very different outcomes following similar instruction and to examine the impact of remediation on the at-risk groups. Here I reflected on how one might recognize if a class/sample is an outlier and discussed remediation strategies used to engage at-risk students/classes including teaching meta-cognitive skills and accurate self-assessment. Following a series of interventions, I saw an improvement in performance of the at risk group on exam 2 with no significant difference between performance of the classes on the exam ($F(8,214)=1.026$, ns.) I also discussed some problems associated with teaching at risk groups including attrition.

Disclosures: S.C. Penley: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.14SU/DD10

Topic: J.02. Teaching of Neuroscience

Title: Neuroscience major development at a primarily undergraduate institution

Author: *P. M. SIMONE, C. SABATIER;
Santa Clara Univ., Santa Clara, CA

Abstract: Undergraduate Neuroscience programs are growing across the United States but continue to be rare at primarily undergraduate institutions (PUI). In response to strong student interest, Santa Clara University launched its Neuroscience major in 2018. Enrollment has grown to over 100 majors and neuroscience is now one of the fastest growing, most popular majors identified by incoming first year students. We will discuss the development of the self-study that identified existing courses to support the program and the strategies taken to support the staffing needs, and the impact of designation as a program vs. department. We have defined an interdisciplinary, integrative curriculum that supports student exploration of neuroscience topics at multiple scales in deep and thoughtful ways that can be managed with the limited resources of a PUI. Student feedback has been instrumental to the development of the program and has led us to evolve critical pedagogical and curricular strategies to support students as they explore their diverse interests and potential career paths, including the launch of a major-wide adoption of e-Portfolios next year. We will share best practices in curriculum development, pedagogy and assessment that other PUIs may leverage to develop their own neuroscience program.

Disclosures: P.M. Simone: None. C. Sabatier: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.15SU/DD11

Topic: J.02. Teaching of Neuroscience

Support: Internal grant supporting civic and community engagement

Title: Educating about neurodiversity: Incorporating autistic perspectives into the classroom

Author: *A. J. LAMPI, L. SHAH, V. K. JASWAL, T. M. EVANS;
Univ. of Virginia, Charlottesville, VA

Abstract: Here we describe a unique collaboration between a group of autistic young adults and college-students in an upper-level undergraduate seminar on autism and neurodiversity. Incorporating the voices, perspectives, and first-hand knowledge of stakeholders in the planning, design, analysis, and interpretation of research studies can improve the quality, rigor, and accuracy of scientific inquiry while crucially ensuring that scientists focus on asking questions important to the lives of those who are being studied (Cornwall & Jewkes, 1995). Traditional participatory research has focused on incorporating the experiences of racial, ethnic, or geographically bound groups (Nicolaidis et al., 2011). But there is a growing recognition that there is utility in extending this approach to the study of groups that experience particular disabilities (Pellicano & Stears, 2011). One group that has been at the fore of advocating for their inclusion in scientific research is the autism community (ASAN, n.d.).

Based on a desire to educate students on the necessity of both scientific rigor and the importance of stakeholder perspectives in autism science, a two-semester course was created. This course, titled “The Science and Lived Experience of Autism,” was designed to provide 20 undergraduate students the opportunity to develop empirical literacy skills while simultaneously engaging with a group of 8-10 college-aged autistic peers to discuss the importance and effects of autism science on the lives of these individuals. In this course, students and community partners critically analyzed topics ranging from the history, diagnosis, etiology and treatment of ASD, while simultaneously engaging in discourse regarding the effects of such research on both the neurotypical and autistic communities at large. Discourse occurred both online and at quarterly meetings of the two groups.

Three cohorts of undergraduate students (n = 60) have now gone through the seminar. Perspectives of the utility of the course were provided by both undergraduate students as well as the community partners. Students self-reported an increased ability to digest scientific literature, as well as an increased motivation to engage in participatory research/discourse in topics regarding autism in the future. Community partners reported on the benefits of inclusive scientific practices, as well as perceptions of the importance of educational opportunities where they were asked for their input. Other implications include institutional-level perspectives of such courses’ utility, as well as a discussion of the means through which this course was conceived and supported.

Disclosures: A.J. Lampi: None. L. Shah: None. V.K. Jaswal: None. T.M. Evans: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.16SU/DD12

Topic: J.02. Teaching of Neuroscience

Support: UNO Center for Faculty Excellence

Title: An interdisciplinary approach to assessment: Evaluating student learning across the neuroscience major

Author: *J. OMELIAN, S. I. SOLLARS;
Univ. of Nebraska at Omaha, Omaha, NE

Abstract: Like many Neuroscience programs, the undergraduate Neuroscience major at the University of Nebraska at Omaha (UNO) is an interdisciplinary program jointly supported by the Psychology and Biology departments. Students take a variety of required courses from both areas along with Neuroscience-specific courses. While the interdisciplinary approach has many advantages, it can be challenging to assess and track students' mastery of programmatic learning goals across multiple departments. This has been particularly problematic for our program, as course offerings in the Neuroscience program itself are generally restricted to introductory or upper-level courses (required intermediate courses consist of classes primarily offered in Biology and Psychology). Thus, an evaluation of student learning outcomes (SLOs) in classes from multiple departments is needed to capture a full picture of student achievement across the Neuroscience curriculum. The UNO Psychology department has been engaged in an evaluation of student learning for the past several years. Briefly, this assessment model uses a pseudo pre-test/post-test design whereby students are assessed on subjects relevant to departmental SLOs during the first week of the semester and results are compared across lower to upper-level courses. Hence the introductory courses serve as a "pre-test" for the mid-level courses, which can in turn be compared to upper-level courses, with the ultimate goal being a complete picture of student learning across the entire curriculum. We adapted and applied this model to courses in the Neuroscience program, while collaborating with the ongoing Psychology department assessment. Tests of SLO attainment were delivered to students in Introductory Neuroscience, Psychology Research Methods and the Advanced Neuroscience Laboratory course (the required capstone course for the major). These results were compared to create a comprehensive view of SLOs across the program. Additionally, a standardized rubric for evaluating student writing assignments was piloted for the writing-intensive laboratory course. The results of our assessments will be used to inform program-level decisions, including future course design and offerings. They will also be shared with relevant stakeholders and used to promote the Neuroscience major to incoming UNO students. Furthermore, comparing this data over time will allow us to visualize the effect of any changes that are implemented. Future investigations will aim to include additional course work from the biology department, allowing us to holistically evaluate best practices at both the course and program levels.

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

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.17SU/DD13

Topic: J.02. Teaching of Neuroscience

Support: QEP internal grant from UCF

Title: Development and implementation of a new high-impact mixed-mode professionalism course for biomedical sciences majors at a large university: Biomedical sciences careers

Author: *A. L. HAWTHORNE;

Burnett Sch. of Biomed. Sci., Univ. of Central Florida, Orlando, FL

Abstract: At the University of Central Florida (UCF), neuroscience is a track within our Biomedical Sciences major. UCF and other institutions have recently pushed to augment the number of high-impact experiences for undergraduates that prepare them for their futures. I developed the course Biomedical Sciences Careers (MCB 3933) with the support of an institutional Quality Enhancement Program grant (with Dr. Bill Self) and workshop. The course received a high-impact designation of Integrated Experience (IE) based on the metacognitive and networking assignments and final project. Biomedical Sciences careers is designed to prepare students for life after graduation and fulfill their career plan, so the class size was limited to 35 seniors. Students completed an individual development plan (IDP) at the beginning and end of the semester. In the first part of the course, students learned about post-baccalaureate educational or training opportunities available, such as masters, medical laboratory scientist, PhD and post-baccalaureate research programs. Some training opportunities were novel to students. In the next part of the course, students explored a variety of different jobs that are available, such as research, industry or medical lab. Expert speakers on the topics were effective in generating student interest. Assessments were assignment- and project-based and included online discussions, metacognitive reflections, IDP, personal statement, resume, elevator speech, interview questions and ePortfolio. Students also networked with individuals within their IDP. For the final examination period, students presented their ePortfolios, which contained their resume, elevator speech video, personal statement excerpts, reflection excerpts, and three areas of interest. Each student tailored their ePortfolio toward the next step in their IDP. During class, 59% of students reported that knowledge from this class has changed their IDP. 89% indicated that the class was helpful, and 85% indicated that the class helped prepare them for their future. Anecdotally, one student was very successful with graduate school interviews, which they attributed in part to their ePortfolio. The goal is for students to apply their degree and to increase their success in and satisfaction with their careers.

Disclosures: A.L. Hawthorne: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.18SU/DD14

Topic: J.02. Teaching of Neuroscience

Support: Rutgers Open and Affordable Textbooks Grant

Title: Exploring the effectiveness of removing textbooks from a junior-level neuroscience I course at a primarily undergraduate institution (PUI) with a high percentage of first-generation low-income (FGLI) students in an effort to decrease course-associated costs

Author: *N. T. FRIED;

Dept. of Biol., Rutgers Univ. Camden, Camden, NJ

Abstract: Rutgers University - Camden (RUC) is a Primarily Undergraduate Institution with very few graduate programs. Reflecting the RUC urban location, the student body is racially and ethnically diverse in traditionally underrepresented groups (16% African-American, 9% Asian, and 13% Latino). The Department of Biology has 350 undergraduates. 54% of these students are first-generation (neither parent has attended college). 72% of its students work off-campus jobs, suggesting a high rate of students from a low-income background. 91% of these students are commuters. However, a healthy number of them (15%) pursue graduate programs after attaining their Bachelor's in Biology. This paints a picture of a large student population from disadvantaged backgrounds that disproportionately strive to further their education. A common challenge these students face is the additional cost of purchasing textbooks. Thus, Rutgers initiated the "Open and Affordable Textbook Program" to support faculty in their efforts to remove textbooks from courses on campus. To this end, we removed the textbook traditionally used, "Neuroscience: Exploring the Brain, BEAR et al", in the 45-student Neuroscience I course. In its place, we integrated active-learning exercises and online materials into a flipped-model classroom. These online materials ranged from open-access online texts to online neuron simulators to an aggregation of materials and primary literature to create a completely open-access library that successfully substitutes the materials offered in the BEAR textbook. Further, since this course was cross-listed with graduate students, we created a two-tier system to allow for more in-depth analysis required by graduate student studies. To assess the curriculum redevelopment of this course, students were surveyed about their experiences of not having a central textbook and whether their interests in pursuing further studies in neuroscience have changed. Future studies will examine whether this has decreased barriers for students from low-income backgrounds to take the course. Currently, it is estimated that removing textbooks from this course will save students \$9,000 each year.

Disclosures: N.T. Fried: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.19SU/DD15

Topic: J.02. Teaching of Neuroscience

Title: Student lectures improve performance even in unrelated writing assignments

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

Abstract: Past results in a cohort of occupational therapy students suggest that preparing and delivering a lecture about a chosen topic during lab period increased confidence and knowledge, and had measurable and reproducible positive effects on exam performance. Here, we test whether confidence in general increases quality of writing about other, unrelated neuroscience topics. The cohort (n=32) is pseudorandomly split into two sections of 16 students each. One lab group was assigned a project to prepare a mini lecture about membrane physiology, the other lab group was given prepared presentations to give on the same topic. Later in the semester, term papers were assigned, and no topics related directly to membrane physiology were allowed. The papers were blinded by assigning numbers to them and removing author information. By previously established measures of confidence, the papers from the students who had done lectures made better use of the primary literature (more primary sources, fewer quotes), and scored higher in general (mean score 21/25 vs 18/25 for the non-lecture group). We conclude that familiarity with the class in general has a favorable effect on writing about topics unrelated to the extra preparation itself.

Disclosures: A.K. Pack: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.20SU/DD16

Topic: J.02. Teaching of Neuroscience

Title: Identification with minority status influences student performance in undergraduate neuroscience courses

Author: *A. C. NICHOLAS¹, Y. YADOLLAHI², N. S. DY²;
¹Univ. of California At Irvine, Irvine, CA; ²UCI, Irvine, CA

Abstract: The University of California, Irvine (UCI), is a first-generation and minority-serving institution, with a minority representation of 68.4%. Traditionally, underrepresented minorities, including Black, Latino, American-Indian, and Pacific Islander students, are less prepared for college. In the transition from high school to higher education, students from underserved and low socioeconomic backgrounds are often times faced with academic challenges. However, studies show that minority students studying at an institution with minority community representation do better compared with minority students studying at other schools. In this study, we investigate whether the degree to which a student feels like a minority influences overall academic performance compared with their actual minority status in undergraduate neuroscience classes. To test this, 536 students in two 2017 general education (GE) STEM neuroscience classes, Brain & Behavior and Pharmacology, were asked to what degree they felt like a minority in lecture, regardless of ethnicity. It was hypothesized that degree of minority identification may not reflect actual status because UCI has substantial minority representation. Our next question was to investigate whether a student's degree of identification had an impact on their overall academic performance. Results showed that minority students with the highest minority identification did significantly poorer in undergraduate neuroscience courses, compared to their minority classmates with low minority identification. No difference in performance was observed for non-minority students with high and low minority identification. There was also no significant difference found between genders. In conclusion, minority students with the highest minority self-identification are at a greater disadvantage in undergraduate neuroscience courses, possibly because of other risk factors, suggesting the need for greater academic support and intervention early on to foster the success of these students.

Disclosures: A.C. Nicholas: None. Y. Yadollahi: None. N.S. Dy: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.21SU/DD17

Topic: J.02. Teaching of Neuroscience

Support: Long Island University

Title: The effect of social reinforcement on student academic achievement

Author: *J. C. NEILL, A. NUZZO, L. TEPPER;
Psychology, Long Island Univ., Brookville, NY

Abstract: Previous research demonstrated that public speaking in an undergraduate science class was associated with impaired memory, elevated heart rates and aversive emotional states. The present exploratory study tested the hypothesis that frequent social reinforcement for correctly

reciting homework answers from memory in class would ameliorate stress reactions to public speaking and increase correct recitations of homework in class, the number of completed homework assignments, and improve accuracy in quizzes. Method: The campus Institutional Review Board approved this project before initiation. Subjects were 12 undergraduates in an upper level psychology course, (1 male and 12 females), ages 18-24 years. Design: The experiment had three phases. In all three phases, students received credit for each homework assignment equal to 1% of their course grade. In phase 1, baseline, students were required to turn in one written 10 question homework quiz. In phase 2, each student was additionally required to publicly recall and recite the answer to a randomly chosen short answer question from the homework, which now included 12 short answer questions per chapter. In phase 3, students were additionally required to recite the correct definition of a randomly selected vocabulary term from the homework. In experimental phases 2 and 3, the instructor and the assistant instructor began to present students with social reinforcement (praise) for correctly answering additional verbal questions in class. Results: after a habituation period in phase 2, all students were able to recite answers to homework questions, from memory, even when the amount of questions increased in phases 2 and 3, suggesting that verbal praise was reinforcing. However, there were statistically significant decreases in group means of objective quiz scores, as determined by one-way ANOVA ($F(2,10) = 6.65, p = .015$). Post hoc comparisons indicated a significant decline across phases 2 vs. 3, ($t(11)=2.561, p=.026$; as well as across phases 1 vs 3, ($t(11)=3.806, p=.003$). Student evaluations of the course were very positive compared to previous courses without the explicit social reinforcers for class participation. Conclusions: social reinforcement was effective in increasing verbal recitation of the material and positive subjective reports about the course experience; however, when public recall and recitation were required, scores on written quizzes consisting of multiple choice and short answer quizzes declined significantly. In agreement with our prior studies, we interpret this finding as consistent with a generalized disruptive effect of requiring public speaking in a modern college setting.

Disclosures: J.C. Neill: None. A. Nuzzo: None. L. Tepper: None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.01SA/DD18

Topic: J.02. Teaching of Neuroscience

Support: NIH/NCCIH Grant R15AT009612 (SMO & BKT)
NIH/NIDA Grant R01DA37621 (BKT)

Title: Providing chiropractic college students with National Institutes of Health-funded basic neuroscience research opportunities

Author: M. C. JORDAN¹, A. G. VANDE HEI¹, C. J. ARENDS¹, R. S. SOZIO¹, R. D. VINING¹, K. HOYT¹, C. R. LONG¹, W. JONES², B. K. TAYLOR³, *S. M. ONIFER¹;
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Abstract: Non-pharmacologic therapies are recommended to manage pain. In particular, doctors of chiropractic commonly use spinal manipulative therapy (SMT) to help manage chronic low back pain. However, little is known regarding SMT's biologic effects and mechanisms of action. To inform both chiropractic students and practitioners, we developed reverse translation and reductionist approaches to demonstrate SMT analgesia in an adult rat model of peripheral neuropathic pain. With funding from our R15 Academic Research Enhancement Award (AREA), we are now employing a multi-site collaboration with this model to both study peripheral neuropathic pain mechanisms altered by SMT and provide chiropractic students with opportunities to apply their neuroscience knowledge in mentored, hands-on research. Doctor of chiropractic students attending Palmer College of Chiropractic Davenport campus engage in a rigorous 3 and one-third years, trimester-based curriculum. An existing Research Honors Program was modified for extracurricular Student Research participation at 3 progressive levels: 1) Observer, 2) Assistant, and 3) Investigator. Through 5 trimesters, 47 chiropractic students inquired about and were introduced to the research study and the Research Honors Program. Nine of 16 Level 1 participants completed observations of research procedures. Three Student Research Assistants are learning how to perform research procedures. To complete their Research Honors project, 2 Student Research Investigators are using immunostained lumbar spinal cord and dorsal root ganglia sections to establish microscopic and morphometric procedures. These will be further used to evaluate changes of a molecular sign of neuropathic pain and neuropeptides associated with pain and analgesia after nerve injury and/or SMT. Two other Research Honors students are studying serum cytokines and their relationship to our rat model and to musculoskeletal pain. All students in the Research Honors Program have participated in journal clubs, literature reviews and have attended seminars to gain familiarity with and to enhance their understanding of basic, clinical, and translational pain research as it applies to current chiropractic research. Not only is the R15 AREA strengthening the research environment so that we can address critical gaps in the neurobiology of SMT, it also is providing chiropractic students with basic science research opportunities that may heighten their interest in pursuing careers as basic or clinical chiropractic neuroscientists.

Disclosures: M.C. Jordan: None. A.G. Vande Hei: None. C.J. Arends: None. R.S. Sozio: None. R.D. Vining: None. K. Hoyt: None. C.R. Long: None. W. Jones: None. B.K. Taylor: None. S.M. Onifer: None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.02SA/DD19

Topic: J.02. Teaching of Neuroscience

Title: Impact of neuroanatomy lab practical exam format on medical students' preference and performance

Author: **R. R. KIMPO**, *B. A. PUDER;
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Abstract: The traditional format for a neuroanatomy lab practical exam has a time limit for each station, requires walking to and keeping track of the next station, and does not allow students to go back to a previous station ('Timed Stations'). To determine whether lab practical exam formats influence the test performance and format preference of medical students, we designed and administered two additional formats using digital images of human brains and brain slices: • 'Timed PowerPoint (PPT) Slides' -- A digitized, anatomical image is projected onto a screen. Students view each image with a time limit while sitting, without the ability to go back to previous images. • 'Untimed Paper' -- Anatomical images are printed on paper. Students take the exam sitting down with no time limit for viewing each image, but with a time limit for the entire exam, and can view previous images. The three formats were randomized across three modules within a neuroscience course for two cohorts of medical students. Data were analyzed double blind to the identity of the students. Here, we show that, indeed, the format of the lab practical exam significantly affected medical students' test performance and preference. This effect depended on how well they performed in the control format ('Timed Stations'). Students who did not receive an 'A' in the 'Timed Stations' format performed better in the untimed, digital format that allowed viewing of previous images ('Untimed Paper'). In contrast, students who received an 'A' in the 'Timed Stations' format performed significantly worse in the timed, digital format that did not allow viewing of previous images ('Timed PPT Slides'). We also show that the students' most preferred format significantly changed after experiencing all 3 formats, from preferring 'Timed Stations' to the 'Untimed Paper'. We conclude that a time limit, moving from station-to-station, and the inability to view previous images, all of which can increase test anxiety, can significantly influence the performance of students. This may be especially true for students who may be more sensitive to the testing environment. Further research is required to measure students' test anxiety during lab practical exams, and how the testing environment may contribute to this anxiety.

Disclosures: **B.A. Puder:** None. **R.R. Kimpo:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.03SA/DD20

Topic: J.02. Teaching of Neuroscience

Title: Evaluation of medical, basic science, and engineering knowledge following completion of the first engineering-integrated pre-clerkship clinical neuroscience medical course

Author: ***R. GALVEZ**¹, J. AMOS², E. T. HSIAO-WECKSLER³, G. HUESMANN⁵, D. LLANO⁵, A. MIRANPURI⁵, B. SUTTON², Y. VLASOV⁴, J. L. ROWEN¹;
¹Carle Illinois Col. of Med., ²Dept. of Bioengineering, ³Mechanical Sci. and Engin., ⁴Electrical & Computer Engin., Univ. of Illinois, Urbana, IL; ⁵Carle Fndn. Hosp., Urbana, IL

Abstract: At the 2018 Society for Neuroscience meeting, we presented a development plan for an engineering-integrated clinical neuroscience medical curriculum (Galvez, et al., 2018). Based on this plan, in January of 2019 the medical students at the Carle Illinois College of Medicine were the first medical class to take an engineering-integrated clinical neuroscience course. To evaluate their knowledge, each week the students were given a timed online quiz consisting of approximately 20 USMLE Step 1 style basic science and clinical questions along with 3-5 similar style engineering questions. Deployment of the quiz was orchestrated through collaboration with Wolters Kluwer Firecracker via their online portal (<http://firecracker.lww.com/>).

This online portal system was used as it provides several advantages for student evaluation, assessment, and comparison to national averages. Due to the engineering integration with our medical school, all of the engineering questions were written by our faculty and thus performance data from other students were not available. In addition to these weekly quizzes, student neuroanatomical knowledge was assessed with an end of course practical.

Given the amount of content that a student is expected to assimilate in medicine and engineering, one could speculate that incorporation of both disciplines without increasing the amount of instructional hours would lead to lower than ideal comprehension for both areas. However, upon evaluation of our medical student's performance compared to the performance of medical students at other universities, our students performed either similar to or better than those at other universities on multiple topics. Overall our students scored an average of 84% correct on basic science and clinical knowledge compared to students from other universities, who averaged 73% correct on the same basic science and clinical questions. Consistent with these findings, our students averaged 81% on an eight week post-course NBME/Progress Exam, compared to 77% for US Step 1 takers. In addition, our students averaged 77% correct on the weekly engineering questions and 90% correct on their anatomy practical. These results strongly suggest that integrating engineering does not dilute medical student clinical or basic science knowledge, but rather provides medical students with an additional engineering framework to enhance their understanding of core topics.

Disclosures: **R. Galvez:** None. **J. Amos:** None. **E.T. Hsiao-Weckslers:** None. **G. Huesmann:** None. **D. Llano:** None. **A. Miranpuri:** None. **B. Sutton:** None. **Y. Vlasov:** None. **J.L. Rowen:** None.

Theme J Poster

025. Higher Education

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LAE – CNPq Grant #409302/2016-3
LAE – CNPq Research Productivity Fellowship #312442/2017-3

Title: An interactive Python notebook as an educational tool for neuromuscular control

Author: *R. G. MOLINARI¹, L. A. ELIAS^{1,2};

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Abstract: In this work, we present an interactive notebook for the use as a learning and research tool of mechanisms underlying muscle force control. The notebook was designed in Jupyter (an open source web-based program for computer coding, data visualization, and word processing) using the Python programming language. Two basic structures of the neuromuscular system were included in the notebook: the neural command and the muscle. The neural command was represented by a phenomenological model proposed by [1], which represents the recruitment and rate coding of the motor units (MUs), along with the discharge rate variability. The synchronization between the discharges of recruited MUs was also represented in the model [2]. Muscle model can generate both force and the electromyogram (EMG). The force produced by each MU was represented as the impulse response of a second-order critically damped system, and a saturation function depending on MU firing rate. Hermite-Rodriguez functions were used to represent the MU action potentials [3]. Amplitude and duration of MU action potentials depend on the relative distance between a pair of surface electrodes and the position of the MU within the muscle cross-sectional area [3]. The morphology of muscle cross-sectional area and the distribution of MU within the cross section can be altered in the model to represent muscle-specific features. All properties of the system can be easily modified (e.g., MU recruitment pattern, discharge rate variability, muscle cross-sectional area morphology, MU regionalization) to study how each element of the neuromuscular system influence force and EMG generation. Voluntary isometric contractions can be simulated using different activation functions (constant, sinusoidal, and trapezoidal). Both time- and frequency-domain analysis of force and EMG were included in the system. Simulations performed using the notebook show that force-EMG relation, force variability, and EMG power spectrum produced by the model match experimental outcomes from humans. The interactive notebook is freely available at www.github.com/molinaris.

[1] Juelevand et al. (1993) J. Neurophysiol. 70(6): 2470-2488.

[2] Yao et al. (2000) J. Neurophysiol. 83(1): 441-452.

[3] Cisi and Kohn (2008) J. Comput. Neurosci. 25(3): 520-542.

Disclosures: **R.G. Molinari:** None. **L.A. Elias:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.05SA/DD22

Topic: J.02. Teaching of Neuroscience

Support: Academic Plan Grant, UCONN

Title: Master of science in surgical neurophysiology: An innovative collaboration between academia and industry

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¹Univ. of Connecticut, Storrs, CT; ²Univ. of Connecticut, Storrs Mansfield, CT; ³Univ. Connecticut, Storrs Manfld, CT

Abstract: Intraoperative neurophysiological monitoring (IONM) is the utilization of a variety of neurophysiological tests that allow ongoing assessment of the functional integrity of certain neural structures during a diverse group of surgical procedures. The data obtained are interpreted by the neuromonitoring team and the results are conveyed to the surgical team on a real-time basis to prevent iatrogenic injuries and in some cases improve the outcome of a vast number of orthopedic, vascular, otolaryngologic and neurosurgeries. Successful performance of an IONM clinician is closely dependent on the level of didactic and clinical education received during the training period. Our department, in collaboration with prominent IONM industry service providers created a graduate certificate in IONM that was established in 2015 that provided didactic and lab training to the students. Although, the current program has been very successful in providing the graduates with preliminary and essential knowledge and skills required for an IONM clinician, due to its short duration (6 weeks), does not cover all aspects of IONM. Specifically, our certificate program does not provide clinical training in the operating room to students, an essential component to allow them to be eligible to take the national certification exam in the field of IONM. Consequently, we concentrated our efforts to add a clinical component to our program over the past few years. Our efforts led to the creation of a new, one-year Master of Science in Surgical Neurophysiology this year at our department. The program will not only include a significant amount of IONM specific didactic and clinical training courses but also provides the students relevant physiology and neurobiology courses that are closely associated with a better understanding of basic science of IONM. Our Master's program provides

an innovative collaboration between healthcare facilities, IONM industry providers and our academic program and can serve as a unique model for similar programs.

Disclosures: **R. Filipovic:** None. **P. Andalib:** None. **J. Lo Turco:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.06SA/DD23

Topic: J.02. Teaching of Neuroscience

Support: Produtividade 1C CNPQ

Title: Using CLIL for neuropharmacology teaching in Brazil

Author: ***H. M. BARROS**¹, F. B. ALMEIDA¹, R. GOMEZ^{2,3};
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Abstract: CLIL stands for Content and Language Integrated Learning. The term “CLIL” is credited to Prof. David Marsh from Finland. CLIL is the teaching of subjects through the use of a language different from the student’s mother tongue. Any subject can be taught in a second language, from history to literature to sports and any subject in the scientific fields. In this case, teaching the students about science content will not use any written or audio material or lectures in their mother tongue. Because English is considered the “worldwide scientific language” it should become the most important second language for undergraduate and graduate students. In courses using the CLIL all classes only use English. The vocabulary, grammar and other linguistic notes, are not explained or translated but rather there is only help to assimilate all scientific content into their knowledge of the English language by natural, repeated exposure, as there is teaching of a subject in class. According to the theoretical background on the subject, immersing the students in classes where the scientific language is presented in English, the students will not only learn about the scientific subjects but also pick up the spoken and written English that is so necessary for the scientific presentation of the research results while writing their own papers and for competencies necessary to present with confidence their work in meetings. CLIL has been demonstrated to be a useful tool for the education of different subjects including in the Pharmacology and Pharmacy fields but there is still very little information on the use of this method for teaching neuroscience and neuropsychopharmacology to graduate students enrolled in Health Sciences training. The course that was presented was “Neurotransmitters and Neuromodulators: from neurochemistry to clinical applications”. This paper will describe the methods used to convince the students and enhance motivation towards the challenge to participate in an only English Course as opposed to a course presented in Portuguese, along with

the methods that were used in class and the perceived advantages and disadvantages described by the students.

Disclosures: **H.M. Barros:** A. Employment/Salary (full or part-time); CNPQ. **F.B. Almeida:** A. Employment/Salary (full or part-time); CAPES. **R. Gomez:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.07SA/DD24

Topic: J.02. Teaching of Neuroscience

Title: A preliminary strategy to provide further education to physicians and caregivers on the dietary approaches to the treatment of autism spectrum disorders

Author: ***D. S. PATEL**, R. E. HARTMAN;
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Abstract: We reviewed the published research on gastrointestinal (GI), behavioral, neurological, and immunological functioning in autism spectrum disorders (ASDs) and focused on dietary approaches to the treatment of symptoms. Several studies have reported that individuals with ASDs are more susceptible to GI issues such as gastric dysmotility. Other studies have demonstrated an overall imbalance in their gut microbiome composition and adverse autoimmune responses to certain foods. These issues and decreased absorption of necessary nutrients can contribute to systemic inflammation and an overall state of malnourishment. Restrictive behavioral patterns (e.g. preference for sweet and salty foods) often contribute to their already poor GI health. Furthermore, ASD children with GI issues tend to demonstrate more severe behavioral dysfunctions (e.g., irritability). We also reviewed several dietary approaches to managing these symptoms (e.g., elimination or reduction of dietary gluten, casein, oxalate and/or carbohydrates) including supplementation (e.g., adding dietary fatty acids, pro- and/or prebiotics, vitamins, minerals, glutathione, phytochemicals, and/or hormones). The research on these dietary approaches is limited and the results are mixed. However, a few approaches, such as reducing dietary and/or casein and supplementing with fatty acids and/or pre/probiotics have generally been associated with improved GI functioning and behavioral symptoms. This demonstrates the potential for these inexpensive and easily implemented therapeutic strategies to ameliorate some ASD related symptoms. Despite the support for their effectiveness, physicians do not seem to disseminate such strategies more often. Research demonstrates a lack of substantial nutrition education among medical schools. One study showed that 41% of medical schools only provide a minimum 25 hours of nutrition education despite 88% of medical school instructors believing students need more than what the curriculum requires. Another study showed only 14% of physicians believing they had adequate training to

provide nutritional counseling. Therefore, we propose disseminating this review as a preliminary step in a larger scale educational plan, targeting physicians and parents of children with ASD, on the significance of the gut-brain axis. Future direction would outline the importance of monitoring nutritional intake and perhaps modifying nutrition to attenuate the behavioral and gastrointestinal symptoms associated with ASD.

Disclosures: D.S. Patel: None. R.E. Hartman: None.

Theme J Poster

025. Higher Education

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Program #/Poster #: 025.08SA/DD25

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant P41 EB018783
NIH Grant R25 HD088157

Title: Short course in adaptive neurotechnologies

Author: *J. S. CARP¹, J. R. WOLPAW^{1,2}, G. SCHALK^{1,3};

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Abstract: The rapidly growing field of adaptive neurotechnologies applies recent advances in neuroscience and engineering to establish real-time adaptive interactions with the CNS that enable new scientific understanding and generate new therapeutic and diagnostic methods (e.g., brain-computer interfaces, operant conditioning of spinal reflexes). Realization of these technologies involves neuroscience, biomedical engineering, signal processing, mathematics, computer science, and clinical and commercial domains. The National Center for Adaptive Neurotechnologies (NCAN) is a NIH-supported Biomedical Technology Resource Center; its mission is to increase understanding of CNS function and dysfunction, to realize new therapies for neurological disorders by creating and validating new adaptive neurotechnologies, and to train scientists, engineers, and clinicians to join in their development, use, and commercialization. To help create the next generation of leaders in this burgeoning new field, NCAN offers a comprehensive three-week Short Course in Adaptive Neurotechnologies at the Wadsworth Center of the NY State Department of Health. In each of the three years since 2016 in which it has been offered, the Course has provided a select group of 24 young scientists, engineers, and clinicians with the multidisciplinary knowledge and expertise needed to guide new adaptive neurotechnologies from conception through laboratory and clinical evaluation to dissemination and use for important scientific or clinical purposes. The course combines lectures, hands-on training, and integrative experiences. Week 1 provides a series of topical lectures

covering basic principles including: neuroscience (neuroanatomy and physiology, emphasizing sensorimotor function); engineering (signal acquisition and processing, hardware and software); and theory and application of adaptive neurotechnologies (for restoring, replacing, enhancing, supplementing, or improving CNS function). Week 2 provides practical demonstrations and hands-on training in design and realization of representative adaptive neurotechnologies. Week 3 is devoted to clinical translation (target populations, clinical trials); commercialization (regulation, intellectual property, funding); ethical and legal issues; and case studies of adaptive neurotechnology development. Thus, course participants gain a comprehensive grasp of the basic theory and practice of adaptive neurotechnologies, the scientific and clinical potential of these technologies, and the critical issues and essential steps involved in their successful creation, translation, and dissemination.

Disclosures: **J.S. Carp:** None. **J.R. Wolpaw:** None. **G. Schalk:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.09SA/DD26

Topic: J.02. Teaching of Neuroscience

Title: A parallel between Gulliver's Travels and the educational journey through the neuroscience course

Author: *C. STEFAN;
New York Univ. Col. of Dent., New York, NY

Abstract: The Neuroscience course for medical, dental or allied health students represents, maybe more than other curricular components, a platform for integration with emphasis on critical thinking. By bringing together multiple disciplines and topics as well as diverse perspectives, this course could be also regarded as a transformative instructional journey. Under these circumstances, it finds a parallel in Jonathan Swift's best known book that presents the imaginary account of a transformative series of fantastic voyages. The chapters follow and complement each other as parts of the continuum in the life of Lemuel Gulliver. His travels offer analogies and inspirational examples regarding the progression through the many aspects of a Neuroscience course: content, sequence of topics, approach to the material, pedagogical modalities, transition from fragmentation to continuity, take-home messages, ethical issues, and scaffolding of knowledge, skills and attitudes. This poster presentation refers to the relation between exposure to and processing of information on one hand and developing various skills on the other, including observation, interpretation, categorization, prioritization, communication, problem solving, decision making, action, reflection, etc. As a meaningful Neuroscience course relies on engaging the learner to become an active participant in it, the focus switches back and

forth multiple times during each lecture, conference or lab session between descriptive and analytical, macroscopic and microscopic, structure and function, development and results, physiologic and pathologic, mechanisms and clinical presentations, certainty and uncertainty, knowledge and applied knowledge. All of these resemble passages from Gulliver's voyages. Moreover, as in the book he was a surgeon who later became a ship captain, supplementing the qualities of a health care provider with adequate leadership skills could be also discussed. By reading Gulliver's Travels, listening to an audio book version, or watching a cinematographic adaptation of the book, we easily become immersed in the story. In a similar way, a well designed and run Neuroscience course, with attention to both detail and context, captivates the students' attention and increases their genuine interest in the matter. They become immersed in its complexity and therefore active learners at each step of the journey. In addition to sharing a common instructional setting and experience, they are encouraged to draw from their own curiosity, explorations and experiences on the pathway towards discovery, self-discovery, and finally competent and compassionate patient-centered care.

Disclosures: C. Stefan: None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.10SA/DD27

Topic: J.02. Teaching of Neuroscience

Title: Traumatic brain injury: A case report

Author: *L. C. BENJAMIN¹, G. C. BENJAMIN^{2,3};

¹Ross Univ. Sch. of Med., Bridgetown, Barbados; ²Princess Margaret Hosp., Roseau, Dominica;

³Family Med. Clin., Roseau, Dominica

Abstract: Introduction: Traumatic Brain Injury (TBI) is a global public health issue. Worldwide, sixty-nine (69) million individuals sustain TBI each year (Dewan et. al., 2019). Falls (30 to 38%), motor vehicle accidents (20 to 30%), occupational accidents (10%), sports/recreational accidents (10%) and assaults (5 to 17%) are the precipitating events for the approximately 2.5 million persons who sustain TBI in the United States each year (Evans and Whitlow, 2019). The blunt trauma and acceleration/deceleration forces produced by these accidents can result in skull fractures, hemorrhage, brain herniations, neurocognitive deficits and several other complications. Intracranial hemorrhage (bleeding within the skull) can be intracerebral (intraparenchymal or intraventricular) or extracerebral (epidural, subdural or subarachnoidal). A patient may be diagnosed as mild, moderate or severe TBI as follows (O'Neil et.al., 2013).

Severity	Glasgow Coma Scale	Loss of Consciousness (LOC)	Alteration of Consciousness (AOC)	Post-traumatic Amnesia	Structural Imaging
Mild	13-15	0-30 min	A moment up to 24 hrs	0- 1 day	Normal
Moderate	9-12	> 30 min < 24 hrs	> 24 hrs	> 1 day < 7 days	Normal or abnormal
Severe	3-8	> 24 hrs	> 24hrs	> 7 days	Normal or abnormal

This case report focuses on a patient who suffered a subdural hematoma resulting in major neurocognitive disorder and physical disability. **Case:** A 27-year-old man fell from a ladder while painting the second floor of a building. On admission, significant findings were, Glasgow coma scale of 6 and paralysis of both lower limbs. Skull X-ray showed basal and orbital skull fractures. CT Scan showed bi-frontal subdural hematoma, contusion, subarachnoid bleed and marked cerebral edema. He was diagnosed with severe TBI. Management included medical and surgical treatment including bi-frontal decompressive craniotomy. When he regained consciousness in hospital several days after the accident, he could not recall any of the events just prior to the fall. Upon discharge from hospital several weeks later, he still had retrograde amnesia. One year later, his mini-mental status exam was 23/30, with significant deficits in concentration and attention, and short term memory. His ability to carry out normal functions of daily living was also significantly diminished. He remained paralyzed in both lower extremities, unemployed, and had limited social and family support. **Conclusion:** This patient suffered severe traumatic brain injury with major neurocognitive deficits.

Disclosures: L.C. Benjamin: None. G.C. Benjamin: None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.11SA/DD28

Topic: J.02. Teaching of Neuroscience

Title: Sociocultural barriers in stem: A graduate course addressing systemic inequity in higher education

Author: *S. M. MEADOWS¹, M. LAMBERT²;

¹Helen and Robert Appel Alzheimer's Dis. Res. Inst., ²Dept. of Med., Weill Cornell Grad. Sch., New York, NY

Abstract: Despite the push to improve diversity and inclusion within the scientific workforce, researchers often remain untrained and unequipped to address the social barriers and inequities that threaten scientific communities. STEM PhD students often take subject-specific courses, but lack access to formal coursework examining the systemic sociocultural barriers that impede scientific excellence. In order to address this gap, we developed a course entitled “Sociocultural Barriers in STEM” for PhD students in the Weill Cornell Graduate School. The goal of the course was to examine social barriers in the scientific workforce through a sociological lens. The course began with two lectures introducing students to sociology and methodology often used in the sociological literature. Subsequent lectures were taught by guest speakers from across New York City and covered specific areas of inequity, such as sexism and gender bias, racial discrimination, socioeconomic inequity, LGBTQ+ representation, among others. Each class consisted of a presentation followed by a seminar-style discussion of an assigned journal article. Students were graded on attendance, discussion participation, a research paper, and a presentation to the class. The research paper asked students to discuss the history of a sociological problem in higher education or science and propose a policy to address this problem. We found that students not only increased their knowledge and awareness of these topics, but were inspired to apply the course material outside of the classroom. Thus, we recommend that courses like *Sociocultural Barriers in STEM* be implemented as part of STEM graduate training across the country.

Disclosures: **S.M. Meadows:** 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.; National Science Foundation Graduate Research Fellowship. **M. Lambert:** 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.; R25 GM130494-01, UL1 TR002384-01.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.12SA/DD29

Topic: J.02. Teaching of Neuroscience

Title: Establishing a comprehensive typology of retinal ganglion cells using FuncSeq

Author: *J. GOETZ¹, *D. GREER¹, G. W. SCHWARTZ²;

¹Northwestern, Chicago, IL; ²Ophthalmology, Northwestern Univ., Chicago, IL

Abstract: Retinal ganglion cells (RGCs) are a diverse population of neurons responsible for transmitting their own distinctive responses to visual stimuli from the retina to the brain.

Although morphological and functional analyses have identified ~40 subtypes of RGCs, a comprehensive classification of these critical neurons does not yet exist. Additionally, single-cell transcriptomic analyses have shown vast diversity between the whole population of RGCs, but sorting through transcriptomic data without a priori knowledge of RGC subtype and function has proven to be a challenge. This gap in knowledge severely inhibits our understanding of the population as a whole, as the few RGC subtypes with known genetic markers have been well-defined and extensively characterized. The goal of this study is to elucidate the ways that transcriptomic variation informs functional and morphological diversity in RGCs. First, we identify an individual cell's functionality by analyzing its cell-attached spike responses to a battery of light stimuli from darkness. Once a cell's functional subtype has been identified, we aspirate the cell and perform whole-transcriptome RNAseq. Our preliminary results indicate that this method reliably generates a full transcriptomic library complete with pan-ganglion cell markers as well as markers of known RGC subtypes, including exclusive expression of genes known to be present in Alpha RGCs and specific subsets of ON-OFF direction-selective RGCs. We have also identified novel markers for previously-published and newly-discovered RGCs. This increased understanding of the correlations between individual neural transcriptomes and physiological functionality will lead to unparalleled insights about neuronal diversity among RGCs. Lessons learned from linking physiological responses to transcriptomics will be broadly applicable to other large-scale efforts to classify neurons throughout the brain.

Disclosures: **J. Goetz:** None. **D. Greer:** None. **G.W. Schwartz:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.13SA/DD30

Topic: J.02. Teaching of Neuroscience

Title: Faculty for undergraduate neuroscience (FUN): Supporting undergraduate neuroscience education and research since 1992

Author: ***R. J. BAYLINE**¹, M. E. MORRISON², H. G. MCFARLANE³;

¹Washington and Jefferson Coll, Washington, PA; ²Biol., Lycoming Col., Williamsport, PA;

³Neurosci. and Psychology, Kenyon Col., Gambier, OH

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 2019 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 holds triennial faculty development workshops, with the next workshop to be held in 2020 at Davidson College. These workshops bring together educators to develop and share best teaching and laboratory practices. The 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 listserv. 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. We will also honor the FUN Student travel award winners, recognize our generous sponsors, and honor faculty award winners.

Disclosures: **R.J. Bayline:** None. **M.E. Morrison:** None. **H.G. McFarlane:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.14SA/DD31

Topic: J.02. Teaching of Neuroscience

Title: Journal of Undergraduate Neuroscience Education (JUNE): A peer-reviewed, open-access and PubMed-listed forum for innovation in neuroscience education

Author: ***R. L. RAMOS**¹, B. R. JOHNSON², I. A. HARRINGTON³;

¹Biomed. Sci., NYIT-COM, Old Westbury, NY; ²Neurobio. and Behavior, Cornell Univ., Ithaca, NY; ³Psychology, Augustana Col., Rock Island, IL

Abstract: The Journal of Undergraduate Neuroscience Education (JUNE; www.funjournal.org) is a peer-reviewed, PubMed-listed and open-access journal published by the Faculty for Undergraduate Neuroscience (FUN; www.funfaculty.org). First established in 2002, JUNE presents articles addressing a wide range of topics focusing on innovation and best practices in undergraduate and graduate neuroscience education. These include course design and student assessment, laboratory exercises using animal models and simulations, outreach and service-

learning activities, opinion pieces and editorials, as well as viewpoints on issues of general concern for undergraduate and graduate neuroscience education. JUNE manuscripts review media and print teaching resources to provide evaluations of textbooks, videos, and web-based material for both classroom and laboratory teaching. Also highlighted are discussions of curricula and professional development, instructions for production of inexpensive, high-quality and sophisticated lab equipment, a series of “amazing” papers in neuroscience, tutorial reviews, and the feature, “Case Studies”, that gives a context to core neuroscience principles. JUNE seeks submissions in any of the above article formats. Please visit the JUNE homepage for more details, submission instructions, and free access to JUNE articles.

Disclosures: **R.L. Ramos:** None. **B.R. Johnson:** None. **I.A. Harrington:** None.

Theme J Poster

025. Higher Education

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 025.15SA/DD32

Topic: J.02. Teaching of Neuroscience

Title: Nu Rho Psi the National Honor Society in Neuroscience

Author: M. J. GILL¹, S. K. DEBBURMAN², ***M. T. KERCHNER**³;

¹Psychology Dept., North Central Col., Naperville, IL; ²Biol., Lake Forest Col., Lake Forest, IL;

³Psychology, Washington Col., Chestertown, MD, MD

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 90 chapters across the United States and over 5500 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 - 2019-20 Brain/Machine Interfaces. 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, visit our web page: <https://nurhopsi.org/>

Disclosures: **M.J. Gill:** None. **S.K. Debburman:** None. **M.T. Kerchner:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.01SU/DD33

Topic: J.03. Public Awareness of Neuroscience

Support: NSF EEC-1028725

Title: Young scholars program-REACH: A neural engineering summer camp for high school students

Author: ***E. H. CHUDLER**^{1,2}, J. M. WIGNALL²;

¹Bioengineering, ²Ctr. for Neurotechnology, Univ. of Washington, Seattle, WA

Abstract: The Center for Neurotechnology (CNT) at the University of Washington hosted a five-day summer program to introduce high school students to the fields of neuroscience, neural engineering and neuroethics. The program also provided basic preparation for college studies in STEM subjects and STEM careers. To apply to the program, students completed an online application that included one letter of recommendation, transcripts and answers to short essay questions about why they wanted to participate in the camp. To date, the YSP-REACH program has been offered during the summers of 2017 (1 session; 22 students) and 2018 (2 sessions; 25 students/session). In 2017, the program was offered free of charge to all students while in 2018, students paid a tuition of \$500. Full scholarships for students with financial need were provided. During the one week camp, participants toured research labs in various departments (e.g., Computer Science and Engineering, Electrical and Computer Engineering, and Rehabilitation Medicine) to learn about CNT research. Students also discussed neuroethics with personnel from the Department of Philosophy to learn about how ethical issues are related to neural technologies. Additional discussions with graduate students helped participants learn about career pathways in neuroscience. Students also performed a sheep brain dissection and recorded neural activity from a cockroach leg nerve. Trend data revealed significant student gains after the program in 1) knowledge of ethical and responsible conduct of research in neural engineering, core concepts in neural engineering, core concepts in neuroscience, and core concepts in neuroethics; 2) understanding how to build scientific knowledge in neural engineering, and the

role of neuroethics in neural engineering; 3) knowledge of innovative practices in neural engineering; 4) confidence of their neural engineering skills and in their ability to succeed at a college or a university and 5) knowledge of careers in neural engineering, industry's role in neural engineering, and of careers in neuroethics. These data confirm that the engaging environment of this program stimulated students' interest in neuroscience and neural engineering research and provided students with information about potential career options, career pathways, and neuroethics.

Disclosures: E.H. Chudler: None. J.M. Wignall: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.02SU/DD34

Topic: J.03. Public Awareness of Neuroscience

Support: Acknowledgements: Rockefeller Neuroscience Institute, WVU Department of Neuroscience, SfN North Western Virginia Chapter, WVU Foundation staff including Ms. Kristen Shipp, and Monongalia County Schools administrative and teaching staff.

Title: Feeding our brains in West Virginia- Coupling neuroscience education with strategic philanthropy as a novel approach to engaging in brain awareness outreach and promoting social embeddedness in the local community

Author: *T. J. PETRISKO¹, R. J. NELSON¹, B. A. WHITE¹, M. A. PRUNTY¹, E. L. STEWART¹, E. B. ENGLER-CHIURAZZI²;

¹Neurosci., West Virginia Univ. Sch. of Med., Morgantown, WV; ²Physiol. and Pharmacol., West Virginia Univ., Morgantown, WV

Abstract: Although brain awareness outreach programs have been active for decades, the graduate and undergraduate students at West Virginia University (WVU) sought to broaden the beneficial impact of our Brain Awareness campaign by pairing it with a philanthropic contribution to the Morgantown community. We first identified an addressable, neuroscience-related issue facing our state: childhood hunger. Malnutrition, resulting in nutritional deficits and inadequate energy supply have detrimental effects on brain development and scholastic performance. Food insecurity is a major issue for many West Virginians; 1 in 5 children live in homes defined as 'food insecure' and ~70% of students qualify for free/reduced school meals (WV Department of Education, 2018). Whereas state law guarantees children are fed in school, the average deficit in unpaid food bills in Monongalia County is ~\$40,000/school/yr (Engler-Chiurazzi, personal communication), meaning that districts allocate funds away from other

resources to meet this requirement. Thus, food insecurity is a significant barrier to academic success among WV children and the high costs paid by local schools to address this issue represent an area for neuroscience-related philanthropic intervention. As such we developed a novel philanthropic component to our outreach program, “Feed Our Brains”. The philanthropic component of our outreach program was established by developing relationships with local community members committed to addressing childhood hunger. A WVU Foundation account was set up, to which online donations could be directed. We also initiated a T-shirt sales program and forged relationships with local restaurant owners to host benefit dinners in which a percentage of the proceeds supported the “Feed Our Brains” program. Each fundraising effort was promoted in a variety of venues, including WVU internal e-news circulars, social media, online events calendars, and press releases—including an endorsement from WVU President Dr. Gordon Gee. Results: Since the launch of Feed Our Brains in the Fall of 2018, we have raised >\$2250. In May 2019, we made our first charitable donation of \$1000 to Monongalia County Schools that accompanied our presentation of our brain awareness curriculum including our newly developed brain nutrition activity, based on the TV show “Chopped,” to ~120 5th grade students. Conclusion: The WVU Neuroscience “Feed Our Brains” program is the first brain awareness outreach program to our knowledge to couple neuroscience education with a philanthropic outcome. We hope this presentation will serve as a primer for those interested in implementing similar efforts in their local communities.

Disclosures: T.J. Petrisko: None. R.J. Nelson: None. B.A. White: None. M.A. Prunty: None. E.L. Stewart: None. E.B. Engler-Chiurazzi: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.03SU/DD35

Topic: J.03. Public Awareness of Neuroscience

Support: NIH P60AA011605

Title: A bilingual interactive exhibition for brain awareness week & the University of North Carolina science expo: Opening doors for the Latinx community

Author: *A. GOMEZ-A¹, J. BESHEER², D. L. ROBINSON²;

¹Bowles Ctr. for Alcohol Studies, ²Bowles Ctr. for Alcohol Studies and Department of Psychiatry, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC

Abstract: In a multicultural environment, it is necessary to overcome language boundaries to reach people from diverse backgrounds when transmitting relevant information. In the framework of the Brain Awareness Week and the UNC Science Expo, the UNC Bowles Center

for Alcohol Studies organized outreach activities about the brain and included bilingual scientists, material and talks (Spanish, Portuguese) for those who do not use English as their first language. During the outreach events, visitors participated in two main activities: 1) the brain station, where participants explored the brain by observing and touching a postmortem human brain, a sheep brain and a model of a brain and skull; 2) brain-related activities, where participants experienced the “brain in action” using different instruments. Each station came with supporting material, specific instructions & scripts in English and Spanish. How did we make this possible?

- Recruiting volunteers: We used an outreach listserv to recruit volunteers. That message included an electronic sign-up link (<https://www.signupgenius.com/>) where people could choose the time/day to volunteer. We also used word-of-mouth to reach more bilingual volunteers.
- Material translation: Based on original material in English, a bilingual scientist translated the material to Spanish using the same figures, colors & contents to keep all the material in a standard fashion.
- Posters and badges: We posted brightly colored signs and used nametags stating “se habla Español” to advertise the volunteers’ bilingual capabilities. Also, because each brain activity has particular instructions, we ask a bilingual volunteer to adapt the activity contents to Spanish (or Portuguese) while talking.
- Asking about language preferences: We asked the visitors about their language preferences when they started the visit.
- Bilingual brochures: We distributed information about underage drinking facts and prevention from SAMSHA and the NIH in English and Spanish.
- Getting feedback: Finally, when a different language than English was used during the activities, we asked people about their experience getting the info in their language. It was particularly special to hear the parents of non-English speaking individuals say they felt more included.

Disclosures: A. Gomez-A: None. J. Besheer: None. D.L. Robinson: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.04SU/DD36

Topic: J.03. Public Awareness of Neuroscience

Support: Quinnipiac University
University of Connecticut

Title: The 32nd northeast undergraduate and graduate research organization for neuroscience (NEURON) conference held at Quinnipiac University's Frank H. Netter M.D. School of Medicine in North Haven, CT

Author: ***R. A. ROTOLO**¹, G. R. TANNER², N. L. TOTTENHAM³, V. FRANCONI⁴, C. A. FRYE⁷, A. C. BASU⁸, J. G. TRAPANI⁹, M. L. LINDEN¹⁰, T. H. AHERN⁵, A. J. BETZ⁶;
¹Psychological Sci., ²Physiol. & Neurobio., Univ. of Connecticut, Storrs, CT; ³Psychology, Columbia Univ., New York, NY; ⁴Med. Sci., ⁵Behavioral Neurosci. Program, Psychology, ⁶Psychology, Quinnipiac Univ., Hamden, CT; ⁷Psychology, Univ. Albany, Albany, NY; ⁸Psychology, Col. of the Holy Cross, Worcester, MA; ⁹Amherst Col., Amherst, MA; ¹⁰Neurosci., Brown Univ., Providence, RI

Abstract: The 32nd NEURON conference was held on February 24th, 2019, at Quinnipiac University's Center for Medicine, Nursing and Health Sciences. Quinnipiac University hosts the website for the NEURON conferences, which includes links to registration, abstract submission, archives of previous talks, resource links, and image galleries (www.quinnipiac.edu/neuron). The 2019 keynote speaker was Dr. Nim Tottenham, Professor of Psychology, Department of Psychology, Columbia University. Her talk was titled Emotional Brain Development and the Role of Early Experiences: Using neuroimaging and behavioral methods to examine development during childhood and adolescence. Dr. Tottenham's laboratory, the Developmental Affective Neuroscience Lab, focuses on the development of the neural circuitry underlying child and adolescent affect—the external manifestations of people's experience of emotion. Her lab is particularly focused on the neural wiring between the limbic system, which mediates emotion, and cortical regions, which are involved in higher-order cognitive processing. This research focus is framed in the context of early-childhood environments and how the ways in which children are raised affects their neural connections and thus later emotional development and behavioral outputs. At the conference, students and faculty participated in four workshops, including: the Careers in Science Panel; Communicating Science: Abstracts and Elevator Pitches; Detectives of Undiagnosed Disease: Utilizing the Undiagnosed Disease Network and Bioinformatic Tools; and Surgical Neurophysiology: An Exciting Frontier in Clinical Neuroscience. The Tieman and Frye awards were given to undergraduate and graduate students to honor the quality of their work and poster presentations. For the fourth year, NEURON partnered with Nu Rho Psi, the national neuroscience honor society, which offered a fourth student poster award. NEURON 2019 grew this past year, representing over 50 different institutions and 9 states. With continued local and regional support from faculty dedicated to student outreach and mentorship, and co-sponsorship from the University of Connecticut, NEURON has continued to expand beyond its original Boston locations to include greater representation from the northeast region and beyond.

Disclosures: **R.A. Rotolo:** None. **G.R. Tanner:** None. **N.L. Tottenham:** None. **V. Francone:** None. **C.A. Frye:** None. **A.C. Basu:** None. **J.G. Trapani:** None. **M.L. Linden:** None. **T.H. Ahern:** None. **A.J. Betz:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.05SU/DD37

Topic: J.03. Public Awareness of Neuroscience

Title: Engaging researchers and trainees in science advocacy

Author: *A. H. TUTTLE;

Neurosci. Ctr., UNC Sch. of Med., Chapel Hill, NC

Abstract: Chronic pain impacts over 50 million Americans, and current pain management strategies are failing to deal with this crippling health issue. Lack of safe, effective analgesics have contributed to the current Opioid Epidemic, with over 47,000 US deaths from opioid overdoses reported in 2017. There is a clear need for continued support of basic pain research, in order to discover new, non-opioid analgesics and other effective non-pharmaceutical chronic pain management strategies. As part of the Society for Neuroscience's Early Career Policy Ambassador's Program, here I present my efforts over the past year advocating for continued pain research support. Specifically, this poster reflects my efforts to educate pain researchers and trainees in effective dialogue strategies with their local policymakers. Working with other professional societies, I identified pain researchers in key congressional districts and instructed them to contact their local policymakers. Willing participants were instructed on the best way to advocate for continued pain research funding, and encouraged to discuss the recent release of the HHS interagency Task Force Report outlining new best practices for evidence-based, patient-focused pain management strategies. Results of these outreach efforts are enumerated and discussed.

Disclosures: A.H. Tuttle: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.06SU/DD38

Topic: J.03. Public Awareness of Neuroscience

Title: Grey Matters Journal: Content diversity and engagement

Author: *S. RAINA, J. BERGQUIST, C. FISHER, T. GUO, S. FISHER, R. RANDLES, F. MIRALLES, G. WANG, A. AHMED, K. SLOCUM, E. STEFANOU;
Univ. of Washington, Seattle, WA

Abstract: Grey Matters is the University of Washington's undergraduate neuroscience journal. Founded six years ago with the mission of open source scientific communication and outreach, Grey Matters has successfully produced 17 journal issues, available for free online. In a political climate rife with scientific ignorance and misinformation, we are committed building the accessibility of scientific research. Our journals display interdisciplinary content, as we involve students from a variety of backgrounds to collaborate as writers, editors, artists, and designers. We produce journals on a quarterly cycle, with each article reviewed by graduate students for scientific accuracy. We also host an annual outreach event called "An Evening With Neuroscience" (EWN), which has drawn over 700 people each year. At this event, a panel of neuroscientists engage with the public, discussing their research and other neuroscience topics in an accessible manner. Because EWN leads to increased interest in our organization, we plan to widen the variety of our content to address this and allow for consistent community engagement. While we are primarily present on social media sites such as Facebook, Twitter, and Instagram, these platforms only target specific consumers. In order to expand our audience, we plan to employ other forms of communication such as videos and podcasts, tapping into markets we are just beginning to address. We are currently creating a new documentary series and developing a neuroscience podcast to broaden both our audience and opportunities for undergraduate involvement. The first documentary episode focuses on Brain-Computer Interfaces, educating the audience about the topic with visuals, explanations, and interviews with researchers in the field. We plan to release the full interviews as podcast episodes, serving as a resource for additional information on the topic and an introduction to leading scientists in their respective fields. We premiered a short segment at EWN, and we plan to release the full video after applying to the SfN video competition. We continue to pursue our mission of bringing scientific research to the public in an accessible way through content variation, maintaining research integrity, and combating issues of science miscommunication.

Disclosures: S. Raina: None. J. Bergquist: None. C. Fisher: None. T. Guo: None. S. Fisher: None. R. Randles: None. F. Miralles: None. G. Wang: None. A. Ahmed: None. K. Slocum: None. E. Stefanou: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.07SU/DD39

Topic: J.03. Public Awareness of Neuroscience

Support: SfN Chapter Grant
WVU RNI
WVU Department of Neuroscience

Title: Reaching young minds in Morgantown, West Virginia

Author: B. A. WHITE, T. J. PETRISKO, *E. B. ENGLER-CHIURAZZI, V. GRITSENKO;
West Virginia Univ., Morgantown, WV

Abstract: Inspiring the next generation to pursue the life of scientific discovery is a wonderful privilege. Often the simplest encounters between local children and scientists at various stages of their careers leave lasting impressions on young minds. Members of the Northern West Virginia Chapter of the Society for Neuroscience have teamed up with the faculty and students of the Department of Neuroscience, the Division of Physical Therapy at West Virginia University and the Rockefeller Neuroscience Institute to create an outreach program that would make such encounters part of the educational experience of undergraduate/graduate student trainees and school children of all ages in Morgantown, West Virginia. We have conducted elementary school visits to teach kindergarteners, as well as 1st and 5th graders about the brain. We have also created event collaborations with Morgantown museums, libraries, and civic centers and conducted other public presentations about neuroscience-related issues of particular importance to the state of West Virginia. Since this program was initiated in 2014, these activities have impacted more than 1500 children, teachers, parents, and residents in the local community. For many children, neuroscience is not covered in the standard curriculum so this outreach program fills an important gap in the elementary education program. Furthermore, undergraduate and scientist volunteers who conducted the outreach activities served as positive career role models while at the same time enhancing their own understanding of the importance of communicating neuroscience to the public. As efforts related to our outreach program becomes centralized, in the future we hope to expand our impact to middle and high school students, and broaden the scope of our program to capture adult and aged populations.

Disclosures: B.A. White: None. T.J. Petrisko: None. E.B. Engler-Chiurazzi: None. V. Gritsenko: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.08SU/DD40

Topic: J.03. Public Awareness of Neuroscience

Support: Instituto de Neuroetología, UV
Centro de Investigaciones Biomédicas, UV

Title: A very close stranger: Knowing the brain

Author: C. J. JUÁREZ-PORTILLA¹, T. MOLINA-JIMÉNEZ³, M. ALVARADO⁴, T. CIBRIAN-LLANDERAL², J. CUETO-ESCOBEDO⁵, G. GUILLÉN-RUIZ⁶, A. A. CORONA-MORALES¹, A. CORTÉS-SOL⁷, A. MARTÍNEZ-CHACÓN⁶, M. J. ROVIROSA⁸, F. GARCÍA-ORDUÑA⁶, E. MEZA⁹, B. BERNAL-MORALES⁶, J. E. MORALES-MÁVIL⁶, J. F. RODRÍGUEZ-LANDA⁶, D. HERNANDEZ-BALTAZAR¹⁰, F. A. GARCÍA-GARCÍA¹, F. NACHÓN⁵, E. TAMARIZ¹¹, D. I. DEL MORAL¹², G. R. ROLDAN¹³, ***R. C. ZEPEDA**¹;
²Inst. de Neuroetología, ¹Univ. Veracruzana, Xalapa, Mexico; ³Facultad de Química Farmacobiología, Xalapa, Mexico; ⁴Neuroetology Inst., Xalapa, Veracruz, Mexico; ⁵Inst. de Ciencias de la Salud, Xalapa, Mexico; ⁶Inst. de Neuroetología, Xalapa, Mexico; ⁷Facultad de Biología, Xalapa, Mexico; ⁸Inst. Neurothology UV, Xalapa, Veracruz, Mexico; ⁹Univ. Veracr, Xalapa, Mexico; ¹⁰Inst. de Neuroetología, CONACYT-Instituto de Neuroetología., Mexico, Mexico; ¹¹Univ. Veracruzana / Inst. De Ciencias De La Salud, Xalapa, Mexico; ¹²Ctr. De Investigaciones Biomédicas, Xalapa, Mexico; ¹³Natl. Autonomous Univ. of Mexico, Ciudad DE Mexico, Mexico

Abstract: One of the main topics in science refers the brain, including the nervous system. The discovery of the brain functions has allowed explaining since basic movements, cognition, emotions up to diseases such as dementia, Parkinson or addictions. Even when the brain controls all physiological functions we do not know the importance and relevance of this organ in the development of human activities. Thereby, it is important the dissemination of the relevance of the study and the care of the brain not only to academics, but also to different cohorts of the society. Thus, under and grad students and faculty members from the Biomedical Research Center, the Institute of Neuroethology, the Institute of Health Sciences, the Medical School, and the faculties of Nutrition, Biology and Chemistry of the Universidad Veracruzana participated in the Brain Awareness Week. The activities included: 5 Brain fairs at kinder gardens and elementary schools; 5 lectures to high school students at the “Carlos Fuentes” library, 15 lectures in high schools; 2 lectures at “Caftan Rojo” Art Gallery; 4 talks at “Zona de Niebla Brewery”; and a minisymposia at the University Anahuac’s Medical School. This year, 50 speakers contributed to the event with over 1K attendees. Our challenge is to gain more interest to the study of the brain, find new audiences as well as more people that help us to propagate the importance of neuroscience.

Disclosures: **C.J. Juárez-Portilla:** None. **T. Molina-Jiménez:** None. **M. Alvarado:** None. **T. Cibrian-Llenderal:** None. **J. Cueto-Escobedo:** None. **G. Guillén-Ruiz:** None. **A.A. Corona-Morales:** None. **A. Cortés-Sol:** None. **A. Martínez-Chacón:** None. **M.J. Rovirosa:** None. **F. García-Orduña:** None. **E. Meza:** None. **B. Bernal-Morales:** None. **J.E. Morales-Mávil:** None. **J.F. Rodríguez-Landa:** None. **D. Hernandez-Baltazar:** None. **F.A. García-García:** None. **F. Nachón:** None. **E. Tamariz:** None. **D.I. Del Moral:** None. **G.R. Roldan:** None. **R.C. Zepeda:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.09SU/DD41

Topic: J.03. Public Awareness of Neuroscience

Support: SFN Chapter Grant
FSU Program in Neuroscience
Congress of Graduate Students

Title: Your brain is a superhero: Increasing neuroscience knowledge through education outreach by FSU neuroscience

Author: *A. C. STIMMELL, K. WALL, K. DAY, S. D. BENTHEM, J. BROWN, C. SIMMONS, J. ZHANG, C. EDWARDS, N. ABRAMS, L. SAILER, C. STRONG, R. AIKEN; 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 2018-19 academic year, graduate students visited high school classrooms and middle school classrooms, coordinated and held a lecture series for high school students called the Friday Neuroscience Lecture Series, and participated in Family Science Night, an event held for K-8 children. Furthermore, we hosted the 13th annual North Florida Brain Bee and 8th annual Brain Fair, and will participate in community educational events. In the fall, we participated in the Tallahassee Science Festival which attracts hundreds of community members of all ages. Our program displays hands-on activity booths that aim to increase neuroscience knowledge and interest. We visited 2 different high schools and used hands-on demonstrations to teach about the five sensory systems and neuroanatomy. 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 2019, the Brain Bee attracted competitors not only from Leon County, but also from different cities in Florida. With funding provided by our program and generous contributors, the Florida Brain Bee winner was sent to compete at the USA National Brain Bee Championship in Hershey, PA. In the spring, we held the Brain Fair. This free and family-friendly event aims to increase awareness of neuroscience in the community and is especially geared towards elementary school aged children. Graduate and undergraduate students across FSU departments had over 20 displays, interactive activities, and demonstrations of basic neuroscience. This year's Brain Fair theme was "Your Brain is a Superhero". After the Brain Fair, neuroscience graduate students participated in Family Science Night, a local community event hosted by the Tallahassee School of Arts and Sciences where scientists from multiple fields conduct interactive demonstrations for children K-8 as well as their families. Additionally, graduate students visited a middle school and educated grades 6-8 about the brain with interactive activities.

Disclosures: A.C. Stimmell: None. K. Wall: None. K. Day: None. S.D. Benthem: None. J. Brown: None. C. Simmons: None. J. Zhang: None. C. Edwards: None. N. Abrams: None. L. Sailer: None. C. Strong: None. R. Aiken: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.10SU/DD42

Topic: J.03. Public Awareness of Neuroscience

Title: NW Noggin: Corrections, bias and brains

Author: *W. S. GRIESAR^{1,3,4}, J. J. LEAKE^{4,2};

¹Psychology/Neuroscience, ²Univ. Studies, Portland State Univ., Portland, OR; ³Behavioral Neurosci., Oregon Hlth. & Sci. Univ., Portland, OR; ⁴Art & Neurosci., NW Noggin, Portland, OR

Abstract: “All is in motion, is growing, is you” - Joy Harjo

Science needs investment and diverse perspectives, and integrating arts in STEM (STEAM) encourages people to get involved. The public pays for research, yet many lack access to useful findings.

Nonprofit NW Noggin (nwnoggin.org) organizes undergraduates and graduates to collaborate, build community networks and inspire people about neuroscience and the arts. Volunteers benefit from work across disciplines and institutions, serve as “near peer” role models, gain skill explaining research, and think creatively about careers. We’ve met over 30,000 people since 2012!

Teenagers undergo dramatic, consequential change in brain anatomy and function, responding to environments and making mistakes. How others react impacts development, benefiting or undermining the trajectory of young lives.

The social rules we learn in adolescence are complex. They depend on who you are, including race, sex, gender identity, sexual orientation, class, neighborhood, national origin and a host of other factors. Research also highlights the significant ethnic and income differences in youth and lifetime experiences of trauma.

Yet in 1994, Oregon voters passed Ballot Measure 11, which established mandatory minimum sentences for “serious crimes against persons” and required defendants aged 15 and older to be tried as adults. Oregon now has one of the highest youth incarceration rates in the country.

Native American, Hispanic and Black Oregonians are incarcerated at disproportionately higher rates relative to white people.

Teenagers are not adults. This year we worked with the Hope Partnership and the Oregon Youth Authority to bring NW Noggin volunteers to the MacLaren Youth Correctional Facility, where

over 200 boys and young men (ages 12 - 25) are confined. We enjoyed powerful discussions about the brain basis of trauma, anxiety, and emotional regulation, bias in judicial and law enforcement systems, pathways in psychology for counseling and research, and what role neuroscientists play, or might play, in judicial and legislative reform. MacLaren youth are studying the law and neuroscience in order to bolster a case for changes to Measure 11. Building excitement and awareness of discoveries, educational options and careers through arts-integrated outreach across institutional, state, federal and generational lines trains new scientists to collaborate, brings useful, actionable knowledge to underserved communities, and increases awareness and support for investment in brain research and the arts.

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

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.11SU/DP15/DD43 (Dynamic Poster)

Topic: J.03. Public Awareness of Neuroscience

Support: P60AA011605
UNC Bowles Center for Alcohol Studies

Title: Memory games - An interactive exhibit for Brain Awareness Week

Author: *D. L. ROBINSON, A. GOMÉZ-A, M. M. MACHADO, M. H. MCFARLAND, J. BESHEER;

Bowles Ctr. for Alcohol Studies, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC

Abstract: For Brain Awareness Week 2019, scientists from the UNC Bowles Center for Alcohol Studies organized an interactive exhibit “Memory Games” as a platform for the community to learn about attention and memory. 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 first explored the human brain by observing and touching a postmortem human brain, a sheep brain and a brain/skull model. Scientists talked with visitors about the different parts of the brain and their function, especially those functions used in the “Memory Games” activity - vision, perception, attention, memory. Scientists answered and asked questions to promote conversation. Next, visitors entered a gated lab area for the “Memory Games” activity, which began with a quick game of Spot It! (Asmodee). In this card game, each card has a number of pictures, and any two cards will have one item (but only one) in common, and whoever identifies the common item first wins the round. This game introduced the concepts of attention and short term memory. Then we explicitly tested short-term memory by showing visitors 10-20 small toys and other items on a tray, giving them time to study them, then

covering the items and assessing how many they remembered. This activity was adjusted based on the age of the visitor, and supported conversations on memory, mnemonics, and attention. Scientist volunteers were given detailed instructions on the activity and trained before their shift. The exhibit was staffed by 35 scientists and students. Approximately 600 children and 260 adults participated in the “Memory Games” activity over the 5 days (4-6 hr/day), with many more engaging with the brain exhibit. The activity was also adapted to an outdoor science expo. As these events were supported by an NIH grant to the UNC Bowles Center for Alcohol Studies, brochures on underage drinking facts and prevention from SAMSHA and the National Institute on Alcohol Abuse and Alcoholism were distributed. Conversations on science outreach and brain health (wearing a helmet, eating healthy food, protecting our brains from drugs and alcohol) were encouraged.

Funded by the Information Dissemination Core of the UNC Alcohol Research Center (National Institute of Alcohol Abuse and Alcoholism, P60AA011605, “Molecular and Cellular Pathogenesis in Alcoholism”).

Disclosures: **D.L. Robinson:** None. **A. Gómez-A:** None. **J. Besheer:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.12SU/DD44

Topic: J.03. Public Awareness of Neuroscience

Support: Donation from The International Brain Research Organization
Donation from The Federation of European Neuroscience Societies
Donation from The Dana Foundation
Donation from The Society for Neuroscience
Donation from the American Psychological Association

Title: The 2019 world brain bee championship

Author: ***N. R. MYSLINSKI;**

Neural and Pain Sci., Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: Future neuroscientists from around the world met in Daegu, South Korea, to compete in the 21th Anniversary Championship of the International Brain Bee (IBB). The IBB is the preeminent neuroscience competition for teenage students. The event was hosted by the **International Brain Research Organization** in September, 2019. Worldwide there are about 175 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

including a neuroanatomy exam using human brains, and a patient diagnosis component. The regions competing were not known at press time, but the regions that sent their champions to the IBB Championship last year (2018) (and their coordinators) were **Australia (Ramesh Rajan), Brazil (Alfred Sholl-Franco), Canada (Judy Shedden), China (Jiangjie Yu), Egypt (Nardene Saad), France (Helen Sahin Connelly), Germany (Ina Simeonova), Grenada (Gail Blackette), Hong Kong (Stephanie Auyeung), India (RMV Ravindranadh R V), Iran (Abbas Hadhparast), Israel (Illana Gozes), Italy (P. Paolo Battaglini), Japan (Tetsu Okumura), Kenya (Nchafatso Gikenyi Obonyo), Korea South (Seong-Whan Lee), Macau (Thomas Lao), Malaysia (Jafri Malin Abdullah), New Zealand (Maurice Curtis), Poland (Elzbieta Malgorzata Pyza), Romania (Cristian Gurzu), Ukraine (Andril Cherninskyi), United Arab Emirates (Sathy Parvathy), United Kingdom (Martyna Petrulyté), and United States (Norbert Myslinski).** The IBB has been recently reorganized as a Non-Profit Foundation with a Board of Directors from the **American Psychological Association, Society for Neuroscience, Dana Alliance for Brain Initiatives, International Brain Research Organization, and Federation of European Neurosciences Societies.** According to the founder, Dr. Norbert Myslinski, the IBB's purpose is to motivate young men and women to learn about the human brain, and to apply that knowledge to their daily lives; and to inspire them to enter careers in the basic and clinical brain sciences to help treat and find cures for brain disorders. An estimated 20,000 students compete annually. More than 100 newspapers, radio, television stations and web sites cover the IBB. 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 motto is: Building Better Brains to Fight Brain Disorders.

Disclosures: N.R. Myslinski: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.13SU/DD45

Topic: J.03. Public Awareness of Neuroscience

Title: The 10th Annual Kingston Brain Bee: Best practices from a small Canadian city

Author: *C. A. LOWRY, K. A. TRESIDDER;
Ctr. for Neurosci. Studies, Queen's Univ., Kingston, ON, Canada

Abstract: The Brain Bee is a neuroscience competition for high school students that is celebrated in more than 50 countries around the world. The competition tests students' knowledge of neuroscience and neuroanatomy, as well as the ability to 'diagnose' neurological diseases. The Brain Bee is an innovative way to stimulate early interest in neuroscience among

adolescents, in addition to providing an enrichment opportunity to learn about the brain and the value of scientific research. The competition is three-tiered, with students participating at local, national, and international levels. There are 17 local Brain Bees across Canada, with the Kingston Brain Bee being one of Canada's smallest competitions. Presented by the Centre for Neuroscience Studies (CNS) at Queen's University, the competition has been organized by a team of graduate students as part of the award-winning Neuroscience Outreach Program for a decade. In 2016, Queen's University was named the Best Local SfN Chapter in the "promoting neuroscience to the public" category at the Canadian Association for Neuroscience Annual Meeting. The Kingston competition, held annually each April, has faced challenges with both student enrollment and retention. Over the past two years, the entire program has been revamped and numerous strategies implemented with the aim of increasing student engagement. One such strategy was the addition of a 'Brain Bee Ambassador' program, whereby previous competitors volunteer to promote the Kingston Brain Bee within their schools, as well as provide peer-to-peer mentorship for prospective competitors. Brain Bee Ambassadors earn volunteer hours towards their high school diploma as a result of their involvement in this program, and are not precluded from subsequently participating again in the Brain Bee should they choose. Other strategies include a 'Question of the Month' contest, as well as two annual 'Q&A sessions' held on-site at the university as a forum for competition preparation. Together, these changes have led to an overall increase in participants since 2017, with a 133% increase in student competitors this year compared to 2018. Additionally, we have witnessed a three-fold increase in the number of repeat competitors in 2019 compared to 2018. Here, we present some of our best practices and tips for recruitment, retention, and competition structure that can be implemented on any scale to improve student engagement in this unique program, as well as raise the profile of Brain Bee within the community.

Disclosures: C.A. Lowry: None. K.A. Tresidder: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.14SU/DD46

Topic: J.03. Public Awareness of Neuroscience

Support: Penn State Neuroscience Institute

Title: The 2019 United States Brain Bee Championship

Author: *K. VENKITESWARAN¹, S. RAVI¹, K. LE¹, E. BLANKE¹, M. SUBRAMANIAN¹, C. WHITE¹, B. CAMERON¹, A. KONDRMASHIN¹, Y. KIM¹, A. BARBER¹, T. SUBRAMANIAN¹, N. R. MYSLINSKI²;

¹Penn State Col. of Med., Hershey, PA; ²Neural and Pain Sciences, 8th floor, Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: After three days of intense competition, the 2019 USA Regional Brain Bee Champion is **John Yang**, representing the Newark, New Jersey, Brain Bee Chapter. The Brain Bee is a neuroscience competition for teenage students. The event was hosted by the **Penn State College of Medicine** and coordinated by **Kala Venkiteswaran** and **Thyagarajan Subramanian**. A record fifty-six Chapter winners from 34 states competed in the USA Championship in April, 2019. John Yang won a scholarship, and a summer internship at a neuroscience lab. 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, and many others. The USA Championship competition involves a neuroanatomy laboratory exam with human brains, patient diagnosis, and a final question-and-answer component. To advance to the USA Regional Championship, John won the Newark, NJ, Chapter competition coordinated by Steve Levison of New Jersey Medical School. Second place went to **Julia Colin** representing **Piscataway, NJ**. Third place went to **Clair Wang** of **Los Angeles, CA**. **Henry Shen** from **Atlanta, GA** came in fourth; **Aashi Anne** from **Rootstown, OH** came in fifth; **Kimberly Shen** from **Minneapolis, MN** came in sixth; **Ifenna Amaefuna** from **Philadelphia, PA** came in seventh; **Daye Kwon** from **Little Rock, AR** came in eighth; **Petra Dujmic** from **Worcester, MA**, came in ninth; and **Bhavya Boddu** from **Washington, DC** came in tenth. John Yang will represent the USA at the twenty-first **World Brain Bee (WBB) Championship in Daegu, South Korea** where he will compete against the regional champions from approximately 27 countries such as **Australia, Brazil, Canada, China, Egypt, France, Germany, Grenada, India, Iran, Israel, Italy, Japan, Kenya, Korea, Malaysia, New Zealand, Nigeria, Poland, Romania, Singapore, South Africa, Ukraine, and others**. The 2019 WBB Championship is hosted by the **International Brain Research Organization**. The USA Brain Bee is an Official Region of the International Brain Bee (IBB). **Dr. Norbert Myslinski, Department of Neural and Pain Sciences, University of Maryland, Baltimore, founded the IBB, directs the USA Brain Bee, and is Chairman of the Board of Directors that is comprised of members from the Society for Neuroscience, the American Psychological Association, the Dana Alliance for Brain Initiatives, The International Brain Research Organization, and the Federation of European Neurosciences Societies**. Dr. Myslinski says, "The Brain Bee's purpose is to motivate young students to learn about the human brain and inspire them to seek careers in the basic and clinical neurosciences to help treat and find cures for brain disorders."

Disclosures: **K. Venkiteswaran:** None. **S. Ravi:** None. **K. Le:** None. **E. Blanke:** None. **M. Subramanian:** None. **C. White:** None. **B. Cameron:** None. **A. Kondromashin:** None. **Y. Kim:** None. **A. Barber:** None. **T. Subramanian:** None. **N.R. Myslinski:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.15SU/DD47

Topic: J.03. Public Awareness of Neuroscience

Title: Columbia University neuroscience outreach: Publicly available curriculum to share science with our local community

Author: ***L. J. SIBENER**, R. VAADIA, M. STACKMANN, M. TSITSIKLIS, L. LONG, A. KAUFMAN, G. M. PIERCE, L. A. COIE, K. M. MARTYNIUK, J. L. SCRIBNER, S. BITTNER, A. VILLEGAS, Y.-N. JEON, G. H. PETTY, A. A. MORGAN, A. BURGOS; Columbia Univ., New York, NY

Abstract: Columbia University Neuroscience Outreach (CUNO), a graduate student-run program, seeks to foster a lifelong interest in the brain and in science among New York City school students and the general public. Since 2005, CUNO has benefited our neighboring community by providing both long-term and stand-alone scientific workshops for school-aged students. CUNO partners with local schools and sends our volunteers to teach single-visit or semester-long neuroscience lessons. Beyond the classroom, we have developed unique programming tailored to engage community members of all ages such as Late Night Science, a monthly-seminar series led by graduate students that welcomes non-scientists into the labs at the Columbia University Medical Campus and the Zuckerman Mind Brain and Behavior Institute (ZI). Here, CUNO student hosts present a community-friendly overview of their research and then guide the visitors through their lab, highlighting the experimental process. CUNO also co-hosts Saturday Science, a monthly community event where we lead hands-on activities and demonstrations to explore the workings of the brain in conjunction with ZI's Educational Outreach Department and BioBus. These programs are made possible by the self-made curriculum CUNO graduate students have developed over the past 14 years. We have now created a database, the Brain Bank, to make these lesson plans available to the public through the CUNO website (columbiabrain.org). The Brain Bank has more than 20 detailed neuroscience lesson plans in both English and Spanish, as well as detailed instructor guides for single classroom visits and hands-on activities. Our curriculum is designed so teachers and outreach groups can download these resources and implement these courses with little to no extra materials and minimal preparation and training. This public database furthers our mission to promote scientific curiosity by expanding accessible science education resources beyond our local community. We hope our outreach program can serve as a model for bringing science to a public audience.

Disclosures: **L.J. Sibener:** None. **R. Vaadia:** None. **M. Stackmann:** None. **M. Tsitsiklis:** None. **L. Long:** None. **A. Kaufman:** None. **G.M. Pierce:** None. **L.A. Coie:** None. **K.M. Martyniuk:** None. **J.L. Scribner:** None. **S. Bittner:** None. **A. Villegas:** None. **Y. Jeon:** None. **G.H. Petty:** None. **A.A. Morgan:** None. **A. Burgos:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.16SU/DD48

Topic: J.03. Public Awareness of Neuroscience

Support: Concordia University Faculty of Fine Arts

Title: The trans-disciplinary convergence course curriculum: Neuroscience, arts, and society

Author: *C. A. ZAELZER^{1,2}, B. FORGET^{1,2};

¹Convergence Initiative, Longueuil, QC, Canada; ²Design and Computat. Arts Fac. of Fine Arts, Concordia Univ., Montreal, QC, Canada

Abstract: “Convergence: Arts, Neuroscience, and Society” is a two-semester interdisciplinary, interuniversity course, where 12 neuroscience students (MSc, PhD, Trainees) from the McGill University Integrated Program in Neuroscience (IPN) and 14 fine art students (BA) from Faculty of Fine Arts (FoFA) from Concordia University work together to create collaborative sci-art projects. The curriculum was developed as part of the Convergence Initiative, a non-profit organization that aims to foster the general public’s understanding of neuroscience by fusing art and science. The curriculum offers a challenging and stimulating combination of lectures, debates, site visits, and workshops. Through independent study, collaborative studio work, and group discussions, the students discover territories outside their scientific and artistic comfort zones. The developed pedagogy transcends disciplinary boundaries by focusing on research practice, public outreach, and questioning disciplinary stereotypes. The 2018/2019 iteration of the Convergence course culminated in an art exhibition that featured an integrated science symposium. The students produced 12 collaborative artworks which artistically interpreted contemporary neuroscience research. Concurrent with the art exhibition, a neuroscience symposium allowed the students to present their science communication media projects to the general public with non-traditional methods learned during the length of the course. In this poster, we share the methods and experiences from this year’s course.



Disclosures: C.A. Zaelzer: None. B. Forget: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.17SU/DD49

Topic: J.03. Public Awareness of Neuroscience

Support: UConn/UTC-IASE Startup Grant

Title: Showcasing controls systems engineering in neurological disorders

Author: *A. DUTTA;

Electrical and Computer Engineering, Biomed. Engin., Univ. of Connecticut, Storrs, CT

Abstract: Twenty million Americans experience some form of neuropathy and 16% of U.S. households contain an individual with brain impairment. Preliminary treatment focuses on pharmacological and psychiatric methods during early stage but fails to keep up as the disease progresses. That's when engineering techniques ranging from computational modeling of the neural pathways to controlling the disorder by electrical stimulation can do a world of good. Thus education and creating general social awareness about the role of engineered systems in controlling neurological disorders has become critical. A three tier approach is proposed: I. A multi-disciplinary educational program on neural-engineering at university level, II. Hands-on outreach activities on neural-engineering at state level, III. Dissemination of popular neural engineering results through mainstream scientific media at global level.

I. Analysis leading to treatment of neurological diseases is by far the most complicated problem as it needs a knowledge of various disciplines ranging from neurobiology, neuro engineering to pharmacy and molecular biology. With the recognition that students seldom have a command on

all, I have a neuro engineering tailored curriculum with an aim to computationally model and control the brain. The translation is through my multi-disciplinary bio-engineering laboratory consisting of electrical circuit fabrication and robotics to neural cell-culture and brain surgery. II. I have created a demonstrator that can be used by kids and adults alike to quickly assemble regions of brain involved in a disorder and connect them together using excitatory, inhibitory or modulatory dynamics. One can then perform neural degeneration or depletion of neuro-modulator to simulate the corresponding disease and come up with subsequent cures current injections in any of the involved regions. This is to be demonstrated in the Rhode Island Brain Week to increase public awareness of benefit of brain research. III. We have created a Cyborg i.e. a biological robot where we developed and surgically connected a micro-circuit to an insect's brain through micro-electrodes, which can then be steered wirelessly. This transformative neuro-muscular control research has been widely published by the mainstream and scientific media generating widespread curiosity amongst the public at large and made them question if such engineered control systems could then be used to control the human brain?

Disclosures: A. Dutta: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.18SU/DD50

Topic: J.03. Public Awareness of Neuroscience

Support: NSF NCS/DRL 1631563
Marie Skłodowska-Curie Individual Fellowship Grant #750026

Title: My so-called lab: Boosting the visibility of women in science

Author: K. L. BRYANT¹, J. PARGETER², H. DINGWALL³, M. YOUNG³, E. JAGODA³, A. C. KRUGER⁴, L. A. LEMING⁵, *E. E. HECHT³;

¹Donders Inst. for Brain, Cognition & Behaviour, Radboud Univ., Nijmegen, Netherlands;

²Anthrop., Emory Univ., Atlanta, GA; ³Human Evolutionary Biol., Harvard Univ., Cambridge, MA; ⁴Col. of Educ. & Human Develop., Georgia State Univ., Atlanta, GA; ⁵WebMD, Atlanta, GA

Abstract: Women and members of minority groups are systemically underrepresented in STEM fields. Progress is hampered by implicit environmental and social barriers, including stereotypes, gender bias, and the climate of STEM departments in colleges and universities. Despite this, research shows that a growth mindset (that is, believing intelligence is a malleable rather than a fixed attribute) is associated with success. A key component of the growth mindset is the

viewpoint that STEM skill is built through experience and learning rather than being an innate characteristic of some people but not others. Here, we describe the development and implementation of *My So-Called Lab*, a digital media outreach project with the goal of promoting a growth mindset in order to counteract implicit and workplace biases in STEM fields. The project also aims to encourage and promote women scientists by making stories about their research more accessible to broader audiences. Although much attention is given to the recruitment of underrepresented groups in science, less attention has been paid to retention, a key issue in the “leaky pipeline.” Therefore, *My So-Called Lab* does not focus on the question of whether or not women and girls should or are capable of doing science. Rather, the project highlights the ongoing work and real-world experiences of women scientists and provides a platform for discussion and engagement. *My So-Called Lab* embraces the diversity and multiplicity of what constitutes research (traditional wet labs, field sites, and digital research spaces) and strives to curate stories from all of these spaces. The project has three main components: (1) an ongoing showcase of lab “selfies”, in which women scientists can submit photos and biographies of themselves doing their research; (2) a podcast series in which women scientists are interviewed to discuss their research, rewarding moments, challenges, and other insights about life in the lab, and (3) several linked social media platforms allowing users to share and discuss this content. As part of our poster presentation, we will introduce the website and social media accounts to the neuroscience community, showcase a selection of interviews and lab selfies, and invite further contribution and participation.

Disclosures: **K.L. Bryant:** None. **J. Pargeter:** None. **H. Dingwall:** None. **M. Young:** None. **E. Jagoda:** None. **A.C. Kruger:** None. **L.A. Leming:** None. **E.E. Hecht:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.19SU/DD51

Topic: J.03. Public Awareness of Neuroscience

Support: National Science Foundation NeuroNex 1707352

Title: Building a bioluminescent and optogenetic learning community through immersive outreach experiences

Author: **K. R. LITERMAN**¹, **J. J. ALLEN**¹, **D. LIPSCOMBE**^{1,2}, **U. HOCHGESCHWENDER**³, **N. C. SHANER**⁴, ***C. I. MOORE**^{1,2};

¹Neurosci., ²Robert J. and Nancy D. Carney Inst. for Brain Sci., Brown Univ., Providence, RI;

³Neurosci., Central Michigan Univ., Mt Pleasant, MI; ⁴Univ. of California, San Diego, CA

Abstract: The Bioluminescence Hub, a National Science Foundation NeuroNex Technology Hub, is dedicated both to the development of novel bioluminescent and optogenetic tools and to the broad dissemination of those tools and the scientific concepts underlying their development. We are committed to education at all levels: the general public, grade and high school, undergraduate, and postgraduate. At the public and K-12 levels, we introduce participants to living bioluminescent organisms and leverage the captivating nature of these organisms to illustrate how these natural lights can illuminate the path toward discovery. In addition to mentoring undergraduate interns at each of our three partner universities, our Hub hosts an annual Undergraduate Practicum at the Marine Biological Laboratory in Woods Hole, MA, an immersive experience where students from around the country meet for lectures, hands-on laboratory experiments and demonstrations, and hone team science skills through a technology venture proposal competition. Our postgraduate training is twofold: we maximize the accessibility and utility of our tools by hosting training Workshops and sending research Emissaries to interested laboratories. In addition to providing recipient laboratories new ways to pursue their research questions, these activities provide our postgraduate team members with the opportunity to serve as educators. By tailoring unique and immersive outreach and education experiences for audiences across learning levels, the Bioluminescence Hub is building a large and diverse community that understands the innovation potential of bioluminescence- and optogenetics-based research.

Disclosures: **K.R. Literman:** None. **J.J. Allen:** None. **D. Lipscombe:** None. **U. Hochgeschwender:** None. **N.C. Shaner:** None. **C.I. Moore:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.20SU/DP15/DD52 (Dynamic Poster)

Topic: J.03. Public Awareness of Neuroscience

Support: STEM award from NASA DC Space Grant Consortium

Title: The OpenBehavior project

Author: ***M. LAUBACH**¹, L. M. AMARANTE¹, M. W. PRESTON, JR², S. R. WHITE¹, A. V. KRAVITZ³;

¹Ctr. for Behavioral Neurosci., American Univ., Washington, DC; ²Neurophysiological Pharmacol. Section, NIH NINDS, Bethesda, MD; ³Psychiatry, Washington Univ., St Louis, MO

Abstract: Open-source tool use has been increasing in recent years, following a revolution in low-cost electronics, 3D printing methods, and circuit board production. The OpenBehavior Project provides the behavioral neuroscience research community with information about new

DIY lab projects, devices, and programs. The website has featured a wide variety of tools, including those for delivering reward, analyzing behavior via video, and interfacing behavioral equipment with emerging technologies for electrophysiology, optical imaging, and fiber photometry. Prior to the launch of our site, access to design files, build instructions, and software typically relied on word of mouth, isolated blogs, and social media posts by individual researchers. Through our project, researchers from around the world have become aware of new open-source tools allowing them to reproduce and implement them into their own research. The OpenBehavior website is 100% non-commercial and all content has been generated by volunteer efforts. To date, the site has featured more than 100 projects, receives >2.5K views per month, and has generated a substantial following on Twitter. We have also developed a partnership with Hackaday.io for sharing designs for neuroscience-related hardware. While our efforts have led to wider dissemination of information about open-source projects for neuroscience research, we believe that the impact of these projects can be even greater. There is a clear need for workshops and training courses on commonly used methods for developing open-source hardware and software. We also need to develop community-supported methods for categorizing tools and tracking their use (e.g. RRIDs). Finally, while options already exist for rapidly sharing designs (e.g. GitHub, Hackaday.io) and efforts are underway to develop new options for publishing open-source tools in major society journals, community buy-in is needed to make these efforts successful. We welcome feedback and discussion on these issues.

The OpenBehavior Project: <https://edspace.american.edu/openbehavior/>

Disclosures: **M. Laubach:** None. **L.M. Amarante:** None. **M.W. Preston:** None. **S.R. White:** None. **A.V. Kravitz:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.21SU/DD53

Topic: J.03. Public Awareness of Neuroscience

Title: Most recent iteration of an open source extruder for bioprinting

Author: ***D. FOSTER**¹, J. KOO¹, R. LEE¹, B. TENG², T. MANZO¹, S. FISHMAN¹, D. WAHLQUIST³, T. VEGVARI³;

¹TheLab Inc, Los Angeles, CA; ²Biol., California State University, Northridge, Northridge, CA; ³PVNet, Rolling Hills Estates, CA

Abstract: Bioprinting is a process that can create 3-dimensional constructs composed of living cells. The technology has been used to make replicable microenvironments for culturing nervous tissue *in vitro*. The ease with which designs can be both replicated and altered using a computer-aided design (CAD) program facilitates investigations on the effects of cell spatial orientation on

cell metabolism. Bioprinters are inherently adept at creating thin layers of cell-infused hydrogels (bioinks). Others have printed representations of the layered human cortex by altering the type of nerve cells infused in successive layers of bioink. We are particularly interested in cell self-assembly and have worked to improve print resolution. An existing extruder has been refined to print a previously described hydrogel in the shapes of pyramids, icosahedrons, cubes, simple vasculature, and scaled down models of organs available from the National Institutes of Health (NIH) 3D Print Exchange. The extruder design has been open sourced and is compatible with delta and Cartesian 3D printers. Tests are being conducted in parallel to optimize a bioink. Progress on the extruder has taken place at multiple community labs, and input has come from people both with and without backgrounds in neurobiology.

Disclosures: **D. Foster:** None. **J. Koo:** None. **R. Lee:** None. **B. Teng:** None. **T. Manzo:** None. **S. Fishman:** None. **D. Wahlquist:** None. **T. Vegvari:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.22SU/DD54

Topic: J.03. Public Awareness of Neuroscience

Title: From cells to circuits toward cures: Updating NIH contributions to the BRAIN Initiative

Author: A. B. ADAMS, K. B. DUPRE, G. FARBER, J. A. GORDON, **N. S. HSU**, W. J. KOROSHETZ, K. M. RAMOS, E. M. TALLEY, S. R. WEISS, *S. L. WHITE;
NIH, Bethesda, MD

Abstract: The **Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative[®]** aims to revolutionize our understanding of the human brain by accelerating the development and application of innovative neurotechnologies.

The NIH BRAIN Initiative largely focuses on neural circuits and networks, and by all accounts, its first five years have been enormously successful. Over 500 awards have been made to hundreds of investigators, totaling nearly \$1B in investment and resulting in over 600 publications. As the Initiative approached its halfway point, **a new Advisory Committee to the NIH Director (ACD) BRAIN Initiative Working Group (WG) 2.0** was convened to assess progress, and to identify key research directions and opportunities to apply new and emerging tools to revolutionize our understanding of how the brain works. Through public workshops, town halls, and opportunities for public comment, the BRAIN WG 2.0 engaged with the broad research community to ensure that they are responsive to multi-stakeholder input. The report, *From Cells to Circuits, Toward Cures*, found the execution of BRAIN to be faithful to the initial strategic vision, resulting in many accomplishments (e.g., the BRAIN Initiative Cell-Census Network). It also identifies new and transformative research opportunities that were not apparent

five years ago.

Among their findings, the BRAIN WG 2.0 suggested a continued focus on technology development, while also increasing the emphasis on experimental science. Organizationally, the WG considered the need to balance individual-investigator research and team science, and the important integration of neuroethics within the Initiative. Areas for greater emphasis include: a diversity of model systems as well as human neuroscience; improved behavioral paradigms; and integration of approaches across scales, including the use of theory and modeling.

Transformative projects were also suggested - for example, circuit-level cures for human neuropsychiatric or neurological disease, an atlas of human brain cell types, and a mouse brain connectome. The WG report suggests ample resources for the organization of science, including training opportunities to broaden the diversity of BRAIN researchers; and strategies to disseminate the emerging technologies and promote data sharing, aligned with a new policy for BRAIN awards.

This poster highlights the findings of the WG's report, as well as BRAIN scientific advancements, tool and technology dissemination, and the myriad partnerships that constitute NIH's contribution to BRAIN. More details can be found at: www.braininitiative.nih.gov

Disclosures: **A.B. Adams:** None. **K.B. Dupre:** None. **G. Farber:** None. **J.A. Gordon:** None. **N.S. Hsu:** None. **W.J. Koroshetz:** None. **K.M. Ramos:** None. **E.M. Talley:** None. **S.R. Weiss:** None. **S.L. White:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.23SU/DD55

Topic: J.03. Public Awareness of Neuroscience

Support: Apple Bank

Title: University and nonprofit partnership: How science education benefits from pairing a large university and a small nonprofit

Author: ***P. L. CROXSON**¹, L. WRIGHT², C. PAIGE¹, L. DINH¹, F. ANSELMINI², R. J. FRAWLEY, III², B. J. DUBIN-THALER², K. E. REMOLE¹;

¹Zuckerman Inst., Columbia Univ., New York, NY; ²BioBus, Inc., New York, NY

Abstract: BioBus at the Zuckerman Institute is a pairing between an academic research institute and a science education nonprofit. Both partners bring significant strengths to the collaboration. BioBus brings expertise in science education and Columbia provides access to a scientific community.

Columbia University's Zuckerman Institute is housed in a research building in Harlem, New

York, with a dedicated, street level space for education and outreach activities. The Education Lab provides a flexible base for programs aimed at students, teachers, adult audiences and families. Set in West Harlem, New York, the location is ideal for serving the community in upper Manhattan and the South Bronx - primarily minority, underserved and low-income populations.

BioBus, Inc. is a nonprofit organization whose mission is to help minority, female, and low-income elementary, K-12 and college students in New York City discover, explore, and pursue science. Since 2008, over 250,000 students at more than 500 schools have discovered the thrill of scientific discovery, with many embarking on a path of scientific exploration and sustained pursuit.

BioBus has a home for their activities in Harlem in the Zuckerman Institute Education Lab, and has populated the space with advanced research microscopes. The Zuckerman Institute's full-time staff of two along with BioBus' extensive team of educators allow for programming to occur in the space 7 days a week. The institutional stability of a university combined with the versatility of a nonprofit opens up access to new funding opportunities and collaborations.

While sharing physical space and resources, we hold joint events, such as Saturday Science, a monthly family science day for families and community groups to explore neuroscience, led by scientists in an informal and highly interactive structure. Each institution contributes activities and resources to each event. We reach an average of over 130 participants each month, a total of over 1000 participants annually, 50% of whom are from our target zip codes in upper Manhattan and the South Bronx. These events allow participants to enjoy unique, fun science activities in an informal setting. They also pave the way for future direct collaborations between the Zuckerman Institute and BioBus.

Disclosures: P.L. Croxson: None. L. Wright: None. C. Paige: None. L. Dinh: None. F. Anselmi: None. R.J. Frawley: None. B.J. Dubin-Thaler: None. K.E. Remole: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.24SU/DD56

Topic: J.03. Public Awareness of Neuroscience

Title: The HEAL (helping to addiction long-term) objectives to advance pain research

Author: D. HANEY, L. PORTER;
Natl. Inst. of Neurolog. Disorders and S, Bethesda, MD

Abstract: The public health significance of chronic pain and adverse effects of opioids reflects an enormous burden to individuals and the nation. Overdoses involving opioids resulted in the death of more than 42,000 people in 2016. At the same time, approximately 50 million US adults

report having chronic pain and often lack effective treatments. These dual crises are intimately intertwined in that alternatives to opioids for pain management are needed to reduce our reliance on opioids. The NIH HEAL Initiative is an ambitious, trans-agency effort that spans the spectrum of basic, translational, and clinical research on opioid misuse, addiction, and pain. The NIH HEAL Initiative will accelerate and advance research efforts to address both issues. To improve our understanding of pain and improve care, HEAL is leveraging existing programs, establishing new infrastructure, and supporting a range of preclinical and clinical studies to accelerate development of new treatments and provide an evidence base for best clinical practices for many pain conditions. HEAL supports programs to accelerate early drug discovery, drug and device optimization, and preclinical testing and validation. The HEAL initiative will establish a pain clinical trial research network to support early phase trials to test safety and efficacy of novel drugs and devices and discovery research to identify biomarkers and endpoints to validate treatment target, stratify patient populations for research and treatment, and predict treatment response. NIH has engaged many partners from both the analgesic drug and device development industry who will provide expertise, assets such as existing compounds which may have analgesic potential, and new compounds under development and testing through the HEAL infrastructure programs. The HEAL initiative also is establishing a pain effectiveness research network to support phase 3 effectiveness trials. This network will perform trials to test pharmacological, non-pharmacological and integrated treatments for many common pain conditions. NIH has planned carefully to optimize the benefits provided through HEAL with the ultimate goal of benefit to the patient.

Disclosures: D. Haney: None. L. Porter: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.25SU/DD57

Topic: J.03. Public Awareness of Neuroscience

Support: NIMHANS

Title: Emotional intelligence and executive functions in children in conflict with law

Author: *B. VIJAY¹, *R. P. REDDY²;

¹Clin. Psychology, NIMHANS, NIMHANS, India; ²Clin. Psychology, NIMHANS, Bangalore, India

Abstract: Background: Crimes over the last decade has risen significantly, not just in adults but adolescents and children as well. Children in conflict with law are those who below the age of 18 have been accused of committing a crime. It has been found that those with lower emotional

intelligence, deficits in their executive functions and insecure attachment styles is a strong predictor of delinquent behaviours, though during this period of childhood and adolescence, their emotional intelligence and executive functions are still being developed. Studies have shown that there is a link between emotions and cognitions, where when emotions are well-regulated, support and maintain executive functions, but when it is poorly regulated, interferes with attention and decision making.

Aim: To examine emotional intelligence and executive functions in children in conflict with the law.

Objectives: To study the emotional intelligence, executive functions, attachment style, and their association and to formulate an intervention module with children in conflict with law.

Method: Cross-sectional design with quantitative analysis was used for the study. The study was divided into two phases, the pilot phase and the main phase. In the main phase after obtaining informed consent, a total of 27 adolescents in conflict with the law were recruited from the state-run observation home. 2 participants dropped out due to severe emotional disturbances. A total of 25 participants as per the inclusion and exclusion criteria were recruited for this study. The study was divided into two parts, part 1 was the assessment phase and part 2 was the development of the intervention model based on the findings. The socio-demographic details were obtained from the adolescent, which consisted of questions relating to their experiences and attachment styles. Verbal N back, colour cancellation, animal naming test, matrix reasoning and block design was used to measure executive functions and Schutte Emotional Intelligence Scale was used to measure their emotional intelligence.

Results and discussion: The data was analysed using descriptive statistics, correlation, both parametric and non-parametric and t-test - parametric and non-parametric. It was found that working memory is positively correlated with emotional intelligence, attention was positively correlated with utilisation of emotions and anger dysregulation was found in all the participants. 90 % was found to have secure attachment with one caregiver, mainly their mothers. Intervention focusing on working memory training for better emotion regulation could be considered to help in building resilience as well as reducing recidivism.

Disclosures: **B. Vijay:** None. **R.P. Reddy:** A. Employment/Salary (full or part-time):: Govt Employee.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.26SU/DD58

Topic: J.03. Public Awareness of Neuroscience

Title: Studying blood vessel architecture at capillary level in mouse brain

Author: *S. GUM, M. HWANG, J. WON, E. LEE, Y. PARK;
Binaree, Daegu, Korea, Republic of

Abstract: Despite of its fundamental role, a detailed brain vasculature architecture at the capillary level remains elusive. In addition, the analysis of vasculature architecture is limited to 2D structures, with apparent limitations regarding the interpretation of vascular architecture. Here, we reconstructed the vascular structure of zebrafish and mouse whole brain using Binaree tissue clearing method combined confocal or light sheet microscopy and image analysis software. For vascular network staining, the Tomato-lectin staining was performed via intracardiac perfusion, and then tissues were transparent with Binaree tissue clearing method. As a result, the topology of branches of the microvasculature were able to be visualized, and 3D vasculature images from zebrafish and mouse brains were acquired. These results suggest that tissue clearing methods have a useful approach to acquire whole brain blood vessel images at capillary level. Thus, it can be applied to anatomical studies of numerous biological and medical specimens and may open up new vistas in brain research.

Disclosures: S. Gum: None. M. Hwang: None. J. Won: None. E. Lee: None. Y. Park: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.27SU/DD59

Topic: J.03. Public Awareness of Neuroscience

Support: University of Arizona Honors College Spirit of Inquiry grant

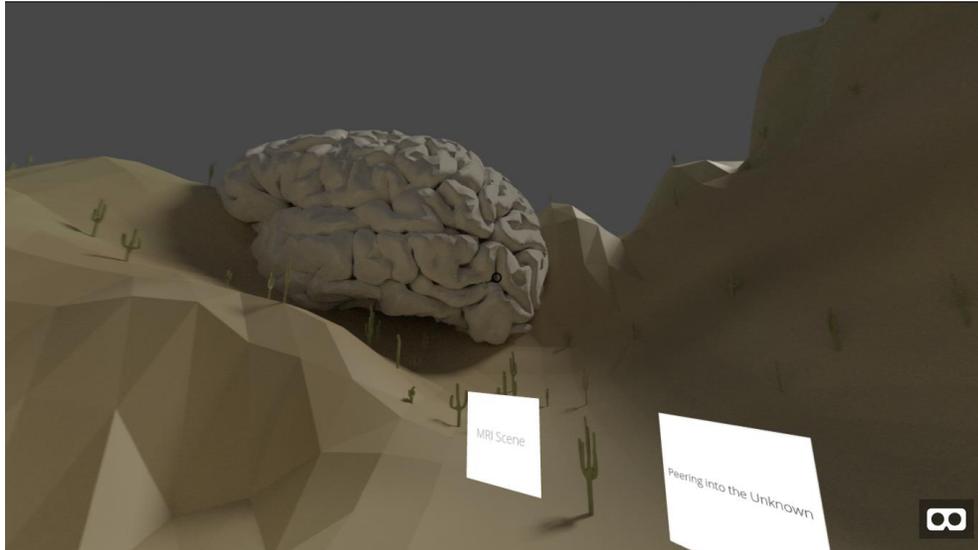
Title: Mental landscapes: Accessible virtual reality for neuroscience outreach

Author: *D. BAYLY¹, J. LEVINE², J.-M. FELLOUS³;

¹Mathematics, ²Computer Sci., ³Psychology, Univ. of Arizona, Tucson, AZ

Abstract: The impact of technology in our lives is often overestimated in the short term, and underestimated in the long term. The cutting edge technology known as Virtual Reality (VR) is one of these. VR is overwhelmingly in use within entertainment, but that is not the limit of its potential. Within education VR has a wide range of possibility. The purpose of this project is to investigate what VR visualization techniques can accomplish in the domain of neuroscience outreach. The goal of the project is to create virtual reality exhibits featuring content from the macro, meso, and micro levels of neuroscience research. Resulting scenes are shared through web portal and in person outreach events in the Tucson Arizona community. The completed set of virtual scenes is assembled to form a curated set of neuroscience exhibits referred to in its entirety as the mental-landscapes museum. This report will cover conceptualization details,

hardware/software choices, content creation workflows, and outreach debriefs of interest to those attempting novel neuroscience outreach of this variety.



Disclosures: D. Bayly: None. J. Levine: None. J. Fellous: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.01SA/DD60

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

Support: Research Project for Practical Applications of Regenerative Medicine (Funds from Japan Agency for Medical Research and Development)

Title: Health economical research for cell therapy against stroke

Author: *H. SHICHINOHE¹, M. KAWABORI², K. HOUKIN²;

¹Div. of Clin. Res. Admin., ²Dept. of Neurosurg., Hokkaido Univ. Hosp., Sapporo, Japan

Abstract: Stroke is still a leading cause of death and disability, and despite intensive research, few treatment options exist. A recent breakthrough in cell therapy is expected to reverse the neurological sequelae of stroke. Since June 2017, we have also started the novel clinical trials, Research on advanced intervention using novel bone marrow stem cell(RAINBOW) study. It is a phase 1, open label, uncontrolled, dose response study. The primary purpose is to determine the safety of autologous BMSC product, HUNS001-01, when administered to acute ischemic stroke patients (Shichinohe H, et al. BMC Neurol. 2017;17:179). However, there are some problems to be solved before the clinical application, for examples, Ethical, Legal and Social Implications

(ELSI) including Health Technology Assessment (HTA) for cell therapy. If the cost of cell therapy would be too expensive, should it be justified? National Institute for Health and Care Excellence (NICE) in UK proposed that less than £30,000 (about \$40,000) per one quality-adjusted life year (QALY: Fig 1) would be appropriate. In our present study, we analyzed QALY using EQ-5D-5L and the medical cost in subjects of RAINBOW study. Because we obtained the preliminary data of QALY from 6 subjects, we will report them (Fig 2).

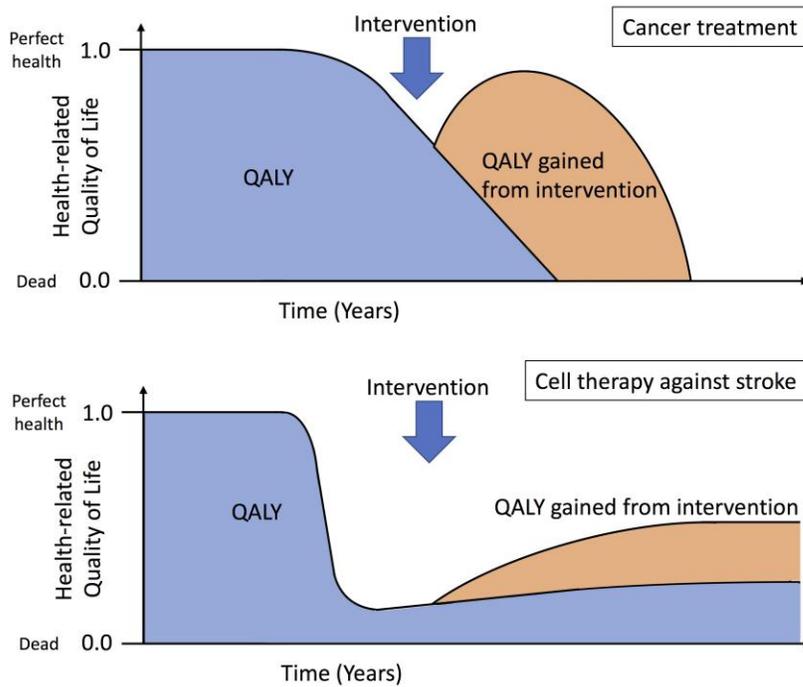


Fig. 1

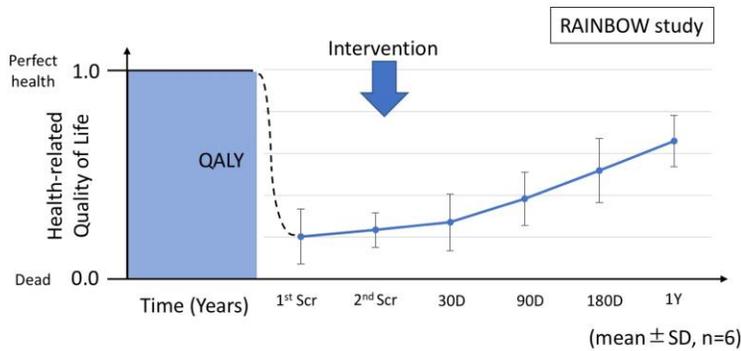


Fig. 2

Disclosures: H. Shichinohe: None. M. Kawabori: None. K. Houkin: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.02SA/DD61

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

Title: Sources of the self: Moral determinants in global integration

Author: *D. C. LARRIVEE;

Intl. Assn. Catholic Bioethicists, Toronto, ON, Canada

Abstract: A foundational premise of the individual is the possession of organismal unity and autonomous self directed behavior, where definitional properties include those of corporal regulation and topological boundaries, emergent global operation, and an interiority uniquely characterized by self identification and self agency [1]. This conception has traditionally been privileged in legal and social polity; by extension, factors mediating autonomy and unity are normatively ordered. Current studies reveal that the physical instantiation of such factors, designated sources of the self [2], emerge intrinsically, from biological features within the individual and extrinsically, from extrinsic factors that shape the individual in adaptation to ecological and cultural niches, largely effected through neuroplastic mechanisms. Among such shaping forces, are pre-moral, i.e., biologically predisposing factors for morality, which are evidenced behaviorally, e.g., empathy and kinship [3]. Increasing evidence reveals that both intrinsic and extrinsic sources of the self assist integration through dynamic and intentional activities including moral practices; that is, the articulation of moral intentions through motor behaviors that function to integrate behavior. Insights from the motor image notably posit that bodily representation is a key feature of the self origin of teleologically directed actions; i.e., actions understood to have objective destinations, where inscribed goals are neurally bound to the representational content of the body [4]. Consistent with this understanding, personalist moral theories, like that of Wojtyla's The Acting Person [5], propose that behaviors ordered to the good function to integrate the individual through the selection of objectively good goals that are enacted in dynamic behaviors. Two body neuroscience findings indicate that moral goal selection is not arbitrary but likely occurs through identification processes that are linked to a universalist and intersubjective referencing. This poster will explore current evidence that links phenomenal and morally informed, motor behavior to processes mediating neural self integration. References: [1] Weigmann K (2013) EMBO Reports 14(9):765-769. [2] Charles Taylor (1989) Sources of the Self: The Making of Modern Identity. Cambridge, MA: Harvard University Press. [3] Decety, J., & Sommerville, J. A. (2003). Trends in Cognitive Science.

7:527-533.[4] Jeannerod M (2009)Exp Brain Res 192(3): 527-532. [5] Wojtyla K (1979) The Acting Person. London: D. Reidel Publishing Company.

Disclosures: D.C. Larrivee: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.03SA/DD62

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

Support: SfN Early Career Policy Ambassadors Program

Title: NeuroVote: A website to keep our elected officials accountable on neuroscience funding

Author: *H. C. MACOMBER;

Neurobio., The Univ. of Chicago, Chicago, IL

Abstract: Without federal funding, neuroscience research in the United States would be severely depleted. Despite our collective interest in increasing the budget for science funding, most neuroscientists are not aware of how their elected representatives have voted on key neuroscience issues. NeuroVote is a website designed to easily track your representative's votes on National Institutes of Health, National Science Foundation, and BRAIN initiative funding throughout their time in elected office. In a nonpartisan and easy-to-understand format, NeuroVote (neurovote.org) clearly lays out how your representatives and senators have voted on crucial neuroscience funding. It highlights any statements they have made about federal funding for research and notes if they are a member of a congressional committee that directly controls neuroscience funding agencies. Using all this information, it gives them a letter grade (A-F) qualitatively describing their enthusiasm for neuroscience research. Additionally, it interfaces with the Society for Neuroscience Advocacy Network to help visitors to take action to support research funding. NeuroVote helps neuroscientists get informed on how their interests are being represented in their government and connects them to the tools they need to get involved.

Disclosures: H.C. Macomber: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.04SA/DD63

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

Title: Neuroethics: An essential partner to enhance the NIH brain initiative

Author: K. M. RAMOS¹, J. D. CHURCHILL², S. HENDRIKS³, *K. B. DUPRE¹, N. S. HSU¹, S. L. WHITE¹, A. ADAMS¹, J. A. GORDON², W. J. KOROSHETZ¹;

¹NIH NINDS, Bethesda, MD; ²NIH NIMH, Bethesda, MD; ³Dept. of Bioethics, NIH, Bethesda, MD

Abstract: The **Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative**[®] aims to revolutionize our understanding of the human brain by accelerating the development and application of innovative neurotechnologies. This work aims to deliver great insight into fundamental principles of brain function and in the development of novel treatments targeting devastating brain disorders or injury.

While this research and the tools that are being developed have tremendous scientific promise, they may raise ethical questions. Many of these questions are familiar bioethics issues but may be sharpened in the context of neuroscience, because the brain is central to our sense of self and personal identity. Neuroethics studies the ethical, legal, and societal implications of neuroscience, and can enable research teams to anticipate and address ethical questions raised by neuroscience research. Neuroethics can serve as a tool that scientists can harness to facilitate neuroscience research and is not meant to constrain research progress.

The NIH BRAIN Initiative prioritizes neuroethics as a key partner with neuroscience research. NIH uses a multi-faceted approach to achieve proactive, ongoing assessment and management of the neuroethical implications associated with the development and application of BRAIN-funded tools and neurotechnologies. The strategy includes: managing an external Neuroethics Working Group that provides recommendations, monitoring the NIH BRAIN Initiative research portfolio to identify relevant ethical questions, funding neuroethics research that is complementary to the discoveries being supported through the Initiative, facilitating collaborations to integrate neuroethics into neuroscience research, and organizing workshops on key neuroethics topics. As the NIH BRAIN Initiative approached its halfway point, a Neuroethics Subgroup of the Advisory Committee to the NIH Director (ACD) BRAIN Initiative Working Group 2.0 has worked to develop a Neuroethics Roadmap for the Initiative. The Roadmap, completed in June 2019, is to be followed by implementation of its strategic recommendations.

This poster highlights the importance of prioritizing neuroethics in the NIH BRAIN Initiative, how neuroethics is embedded in BRAIN research, neuroethics research opportunities and funding in BRAIN, and summarizes the Neuroethics Roadmap. More details can be found at: <https://www.braininitiative.nih.gov/brain-programs/neuroethics>.

Disclosures: K.M. Ramos: None. J.D. Churchill: None. S. Hendriks: None. K.B. Dupre: None. N.S. Hsu: None. S.L. White: None. A. Adams: None. J.A. Gordon: None. W.J. Koroshetz: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.05SA/DD64

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

Support: University of Minnesota Internal Grant Support

Title: Is there an ethical duty to report the socioeconomic status of research participants in human neuroscience research?

Author: *F. X. SHEN^{1,2};

¹Univ. of Minnesota, Minneapolis, MN; ²Psychiatry, Massachusetts Gen. Hosp., Boston, MA

Abstract: Research is increasingly documenting the effects of socioeconomic stress on brain development and function (Johnson et al 2016). In rodent models, researchers have simulated poverty by restricting diets and modifying environment, finding that these socioeconomic stressors negatively affect neural circuitry (Molet et al 2014). Given this emerging body of research on poverty and the brain, this study asks whether the responsible conduct of research in human neuroscience should require reporting the socioeconomic status (SES) of research participants. The study proceeds in four parts. First, the study conducts an empirical examination of published human neuroscience studies from the NIH BRAIN Project, as well as recently published articles in highly ranked peer-reviewed journals, to estimate the frequency with which SES demographics of research participants is presently reported. The data suggest that SES relevant demographics such as education and income levels are published less than 5% of the time. Second, the study reviews the growing body of evidence that samples in human neuroscience studies are often drawn entirely from Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies (Burns et al., 2019). Third, the study discusses how SES data is readily available, is typically reported in many social science studies, and is even a part of the Human Connectome Project public datasets (which include self-reported data on education and income, as well as race, ethnicity and relationship status). The fourth and final part of the study turns to the ethical concerns, by asking: Is poverty a biologically relevant variable? And, given the likely demographic discrepancies in socioeconomic status between the population and the samples typically used in human neuroscience, is there an ethical duty to publish the socioeconomic status of one's research participants? The study identifies arguments both for and against the reporting these SES demographics, and concludes that the expected benefits of reporting the demographics likely outweigh the potential costs. The study proposes a path forward by which this demographic data could be more readily reported in published studies, and discusses the potential implications of reporting other demographic data such as participant race.

Disclosures: F.X. Shen: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.06SA/DD65

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

Support: R01MH114854
Brain & Behavior Research Foundation (NARSAD)
UPR MSC Chancellor's Office
UPR MSC Deanship
PRCTRC Pilot Award

Title: Device removal following brain implant research

Author: *D. SIERRA-MERCADO^{1,2}, P. ZUK^{2,4}, A. MCGUIRE², W. K. GOODMAN³, G. LÁZARO-MUÑOZ²;

¹Anat. & Neurobio., Univ. Puerto Rico Sch. of Med., San Juan, PR; ²Ctr. for Med. Ethics and Hlth. Policy, ³Psychiatry & Behavioral Sci., Baylor Col. of Med., Houston, TX; ⁴Dept. of Philosophy, Rice Univ., Houston, TX

Abstract: Brain implant research (e.g., deep brain stimulation trials) could help develop interventions for brain-based conditions such as treatment-resistant movement and mental health disorders. At the end of brain implant trials, most participants will have contributed to scientific knowledge, but may not receive direct benefit. What happens to participants who did not benefit and would like the device removed? Our review of 8 protocols and ongoing interviews with brain implant researchers (current n = 18) suggests that researchers/sponsors generally do not cover the cost of device removal. If there is no medical need (e.g., infection), health insurance will usually not cover removal either. Thus, there is a potential risk of financial burden for research participants. We examine whether researchers/sponsors have an obligation to pay or facilitate removal of experimental devices when a study ends, even if it is not medically necessary. From a legal standpoint, there is no obligation to pay for device removal. IRBs generally do not require researchers/sponsors to pay for removal. Device removal is also not the standard of practice in brain implant research, thus, it would be difficult to argue negligence. Now, is there an ethical obligation to cover the cost of device removal? In this presentation, we identify and weigh the potential harms and benefits of device removal against keeping the device implanted but turned off at study conclusion. We also use the Partial-Entrustment Model (Richardson and Belsky 2004) to evaluate the obligations that may emerge between researchers and participants in this context.

Disclosures: D. Sierra-Mercado: None. P. Zuk: None. A. McGuire: None. W.K. Goodman: None. G. Lázaro-Muñoz: None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.07SA/DD66

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

Title: Research misconduct investigations oversight at two federal science agencies

Author: ***E. A. RUNKO**¹, **R. AMBALAVANAR**², **A. P. RUNKO**²;

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Abstract: Federal regulations define research misconduct as fabrication, falsification, or plagiarism (FFP) in proposing, performing, or reviewing research, or in reporting research results. The United States (U.S.) regulations, policies, and procedures related to research misconduct are carried out by several federal agencies, including the Office of Inspector General (OIG) of the National Science Foundation (NSF) and the Office of Research Integrity (ORI) of the U.S. Department of Health and Human Services (HHS). The NSF OIG provides independent oversight of NSF's programs and operations, accomplishing its mission through audits and investigations. In addition to investigating grant fraud and misuse of grant funds, NSF OIG investigates allegations of research misconduct. NSF OIG makes recommendations to NSF which adjudicates and imposes a variety of appropriate actions that range from a letter of reprimand, requirements of certifications and assurances, requirements of responsible conduct of research training, restriction of activities, debarment of an individual from receiving Federal funds, and other administrative actions. HHS ORI oversees institutional investigations of research misconduct allegations on U.S. Public Health Service (PHS)-supported research, including those of the National Institutes of Health (NIH). HHS ORI makes independent findings of research misconduct which may result in letters of reprimand, research supervision, requirements of certifications, correction or retraction of affected publications and voluntary exclusion settlement agreements as HHS administrative actions. HHS ORI also directs activities to evaluate programs, promote research integrity and prevent misconduct. In this poster, we will present the research misconduct case flow processes for NSF OIG and HHS ORI from allegation to investigation, determination and adjudication. We will also summarize notable trends and statistics of research misconduct case findings.

Disclosures: **E.A. Runko:** None. **R. Ambalavanar:** None. **A.P. Runko:** None.

Theme J Poster

027. Neuroscience and Society: Ethical and Policy Issues

Location: Hall A

Time: Saturday, October 19, 2019, 1:00 PM - 5:00 PM

Program #/Poster #: 027.08SA/DD67

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

Title: Empirically gauging how sensitive the public views their brain data

Author: *W. L. KRENZER¹, N. A. FARAHANY²;

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Abstract: Scholars have been discussing for years the concerns and harms people feel towards their private (e.g., social security number; SSN) and brain information (e.g., thoughts in one's mind) being collected and shared, however, currently there is little data to support those claims (Farah, 2011; Hallinan et al., 2014; Ienca, 2015; Moore, 2017). With technology allowing brain activity to be decoded into interpretable information, understanding people's beliefs about the harms surrounding their brain information being accessible is vital for the development of comprehensive policy. Our first study built off of previous research on the perceived sensitivity of private information (PEW, 2014) by adding brain information items based on what can currently be decoded from one's brain data and having people ($N= 1,415$, Female = 53.4%) rate how sensitive they viewed each information item to be. While SSN was rated as the most sensitive piece of information (all comparison's had $Z > 15.99$, all $p < .00001$), we saw differences arise in the sensitivity ratings of the brain information items as they grouped into four distinct clusters with the private information items: sensitive thoughts and personal communication (e.g., "the mental thoughts in your mind", "your credit score and credit history"), biological information (e.g., "details about your brain health", "your genetic information"), attention and focus ("concentration level", "internet search history"), and less sensitive identifying information ("drowsiness level", "your birth day"). These differences in the rating of brain information items could be due to people being unable to identify what adverse events could occur from their brain information being obtained about them. Using items from these clusters, our second study asked people ($N= 109$, Female = 45.8%) to list as many adverse events that could occur if someone had access to their information. People consistently cited employment trouble (accounting for 25% of responses) as a potential adverse event that could occur if someone had access to their brain information. However, that consistency waived when it came to adverse events within the biological information cluster. These findings suggest that while people are concerned with their brain information being obtained, they are inconsistent with what the potential harms could be. These results show how important educating the public, and policy makers, about the potential harms that could arise from shared brain data being decoded.

Disclosures: W.L. Krenzer: None. N.A. Farahany: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.01SU/CC57

Topic: J.02. Teaching of Neuroscience

Support: W.M. Keck Foundation (GR529005)
National Institutes of Health (R21MH101525; R21EY026427; U01NS099709)
National Science Foundation (CBET-1464686; NeuroNex-1707352)

Title: Application of bioluminescence and neuroscience concepts for AP biology curriculum development

Authors: *E. L. CRESPO¹, J. J. ALLEN³, K. R. LITERMAN³, N. C. SHANER⁵, D. LIPSCOMBE⁴, U. HOCHGESCHWENDER², C. I. MOORE³;
¹Central Michigan Univ., Mount Pleasant, MI; ²Neurosci., Central Michigan Univ., Mt Pleasant, MI; ³Neurosci., ⁴Brown Univ., Providence, RI; ⁵UCSD, San Diego, CA

Abstract: Our National Science Foundation NeuroNex Technology Hub: Bioluminescence for Optimal Brain Control and Imaging aims to create novel, genetically-encoded, bioluminescent light sources fused with optogenetic tools for neuroscience research. The conceptual framework underlying our experimental approach is an ideal basis for novel curricula, and in parallel to our research, we aim to educate students of all levels. Bioluminescence is a chemical reaction in which an enzyme, a luciferase, generates light by catalyzing a small molecule, a luciferin. This biological phenomenon is intrinsically captivating and an ideal model to teach integrated biology, chemistry, physics, and neuroscience. We propose a novel curriculum for Advanced Placement (AP) high school biology students where bioluminescence is a recurring, multifaceted theme. Subtopics as diverse as animal behavior (e.g., angler fish using bioluminescent lures), enzyme catalysis (e.g., luciferase catalyzing luciferin to produce light), transcription (e.g., expressing luciferase in mouse models for neuroscience), and the properties of light underwater (e.g., different wavelengths travel different distances) can all be illustrated with bioluminescence. Teachers will have two options for delivery of this curriculum: revisiting bioluminescence periodically during the academic year as students study a variety of topics in preparation for the AP exam, or as a week-long, immersive, capstone experience after the AP exam where students can integrate all they have learned to understand bioluminescence at the molecular, cellular, organismal, and community ecology levels. Throughout the development of this curriculum, we will solicit feedback from AP biology teachers to ensure its utility. Following a pilot in Spring 2020, we will post this curriculum on our website, bioluminescencehub.org, for broad dissemination.

Disclosures: E.L. Crespo: None. J.J. Allen: None. K.R. Literman: None. N.C. Shaner: None. D. Lipscombe: None. U. Hochgeschwender: None. C.I. Moore: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.02SU/CC58

Topic: J.02. Teaching of Neuroscience

Support: PROEX/UNESP

Title: Prevention of abuse and addiction to alcohol and other drugs to adolescents: Diffusion of knowledge through interactive methodologies

Authors: *G. MORAIS-SILVA, C. F. LAVERDE, C. DE OLIVEIRA, Jr, C. S. XAVIER, C. T. DEPENDTOR, D. M. OGUIURA, G. C. DE SOUZA, L. L. S. MARTINS, L. O. GIATTI, L. T. DE SANTANA, M. G. SANSÃO, J. A. CAMARGO, M. T. MARIN;
Sch. of Pharmaceut. Sci., Sao Paulo State Univ., Araraquara, Brazil

Abstract: Drug abuse is a serious public health problem and adolescence is the phase of development that the first contacts with drugs of abuse usually take place. Also, drug abuse during adolescence can induce long-lasting impact on drug-related health problems and prevalence of lifetime drug addiction. However, it is difficult to implement educational activities that attract the attention of adolescents. Our research group was previously focused only on basic research of the neurobiology of addiction on School of Pharmaceutical Sciences-São Paulo State University (UNESP) in Araraquara-SP, Brazil. In 2017 other activities orientated to teach aspects of addiction were trained and a booklet of orientations about the interactive activities to be developed with the adolescents was formulated. The interactive activities include games, mini-presentations (15 min maximum) and video and music presentations followed by discussion. The actions were intended to attract adolescent's attention and to pass on current, scientifically grounded and unbiased information. The sequence of activities was applied to adolescents of 7th or 9th grades (12 to 15 years old) by the professor/researcher, graduate, and undergraduate (Pharmacy course) students. All activities were performed in scheduled days during the normal classes of adolescents (4 meetings of 100 min each) in a public school. This project started in 2017, was adjusted based on feedback from adolescents and school teachers and again tested in 2018. In this year the project expanded the number of attended schools, which are indicated by the city local council of drug abuse policies. Nowadays, our group of research and teaching about alcohol and other drugs (PensAD, from Portuguese *Pesquisa e Ensino sobre Álcool e outras Drogas*) tries always to put together research and teaching of themes related to addiction. This combination of expertise areas helps to illustrate the importance of research and its application. Also, it leads to the population surrounding the university a current and scientifically based information.

Disclosures: G. Morais-Silva: None. C.F. Laverde: None. C. de Oliveira: None. C.S. Xavier: None. C.T. Depentor: None. D.M. Oguiura: None. G.C. de Souza: None. L.L.S. Martins: None. L.O. Giatti: None. L.T. de Santana: None. M.G. Sansão: None. J.A. Camargo: None. M.T. Marin: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.03SU/CC59

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant R25 GM129233-03

Title: BrainWaves: An EEG-based neuroscience program

Authors: *I. DAVIDESCO, E. LAURENT, S. AZEKA, H. VALK, S. DIKKER, W. SUZUKI; New York Univ., New York, NY

Abstract: BrainWaves is a high school and college neuroscience curriculum, where students become brain scientists in an original study of their own creation. Students are provided with the content knowledge and practices to design and conduct a neuroscience research study in their own classroom with the use of portable low-cost brainwave measuring devices (electroencephalography (EEG) headsets). The curriculum is accompanied by app that guides students through the process of designing their experiments, as well as collecting and analyzing data. Preliminary evaluation results suggest that students' content knowledge and self-efficacy in conducting research have significantly improved after participating in the program.

Disclosures: I. Davidesco: None. E. Laurent: None. S. Azeka: None. H. Valk: None. S. Dikker: None. W. Suzuki: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.04SU/CC60

Topic: J.02. Teaching of Neuroscience

Support: Arthur Ashe

Title: Research experience in autism for college and high school students, a pipeline program for underrepresented students in medicine and neuroscience

Authors: R. CESAR¹, J. ALARCON², A. LOPEZ¹, M. VALMONT⁴, A. DANIELS-OSAZE³, C. BOUTIN-FOSTER³, *J. LIBIEN²;

¹Col. of Med., ²Pathology, ³Office of Diversity Educ. and Res., SUNY Downstate Hlth. Sci. Univ., Brooklyn, NY; ⁴Arthur Ashe Inst. for Urban Hlth., Brooklyn, NY

Abstract: REACH (Research Experience in Autism for College and High School students) is a month-long summer pipeline program for underrepresented students with an aim of attracting students to neuroscience related careers. REACH immerses students in educational and research experiences focused on Autism Spectrum Disorders (ASD). Students work to understand the behavioral, functional, and molecular elements of ASD through a combination of lectures, laboratory experiences, technical training, and clinical observation guided by neuroscientists, neuropathologists, nurses, pediatricians, special education teachers, and child psychiatrists. While the focus is on ASD, students gain research design and laboratory skills necessary for future scientific inquiry. Program participants are separated into groups of 3-4 students headed by neuroscience graduate students or medical students who serve as near-peer mentors. Students develop their own projects through collaborative hypothesis generation and experimental design and then perform their planned experiments, and collect and analyze the data. They present their data to each other, allowing peer-to-peer mentoring during feedback sessions. Career exploration sessions allow students to learn about career paths in neuroscience and the health sciences as well as health disparities, and the steps needed to enter different careers. After completion of the program, students fill out surveys to gauge any changes in their perceptions and knowledge of ASD and interests in future autism and/or general research. 10 of 12 students that completed the program responded to the survey. Survey responses indicated that students overall had increased interest in pursuing research after the program, with some students hoping to continue with ASD research. Students expressed satisfaction with the research experience for several reasons with an emphasis on mentor facilitated activities and student led project design, with individual interactions with mentors and faculty being a major benefit of a smaller program. Many students indicated they would benefit from additional skills training in laboratory techniques and more educational lectures to further their understanding of ASD. Programs such as REACH which include mentoring in career development, neuroscience education, and clinical and research experiences may be successful in increasing student motivation and success in pursuing careers in neuroscience and medicine.

Disclosures: R. Cesar: None. J. Alarcon: None. M. Valmont: None. A. Daniels-Osaze: None. J. Libien: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.05SU/CC61

Topic: J.02. Teaching of Neuroscience

Support: University of Calgary Teaching and Learning Grant

Title: Behavioral neuroscience: An open access approach to education

Authors: *S. C. SPANSWICK, J. MONCREIFF, M. C. ANTLE;
Univ. of Calgary, Calgary, AB, Canada

Abstract: The rising cost of educational materials can influence which courses students take, or their decision to purchase required course textbooks. This, combined with prepackaged course materials that may not always align well with course content can hamper student learning. Open access educational resources (OERs) provide a solution to the increasing financial burden experienced by the student population. OERs also allow instructors to modify educational materials, ensuring appropriate alignment with the conceptual framework of a given course, as well as keeping course material current with advances in neuroscience. Here we discuss a modular OER for a senior-level undergraduate behavioral neuroscience course. Specifically, we developed an online laboratory manual that includes a selection of suggested laboratory activities, each of which includes relevant background information, access to online resources, and clearly defined class learning outcomes. Included with each activity are suggested student assignments and detailed rubrics outlining expectations and assessment approaches. Each laboratory exists independently such that users can select the modules that best align with their course offering. Our laboratory manual has the added benefit of allowing users to suggest/update educational materials, assuring that course content and student assessment techniques remain current with best pedagogical practices. This, in combination with a searchable Digital Object Identifier (DOI) will allow educators across academic institutions to freely access our manual and modify it for their purposes.

Disclosures: S.C. Spanswick: None. J. Moncreiff: None. M.C. Antle: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.06SU/CC62

Topic: J.02. Teaching of Neuroscience

Title: The weight among us: Teaching about obesity from a neuroscience perspective

Authors: *G. C. HERRON, A. S. CLARK;
Psychological and Brain Sci., Dartmouth Col., Hanover, NH

Abstract: Obesity is a growing public health concern in the U.S. While there have been many advances in the scientific understanding of obesity, many questions remain unanswered. We sought to develop a course that would examine these different questions about obesity from a neuroscience perspective. The course will be offered as a culminating seminar for junior and senior students studying Neuroscience. In the course, students will learn how the successes and failures in obesity research translate to obesity prevention and clinical treatment. The main topics that will be addressed in the class are as follows: Defining and Measuring Obesity, Brain Pathways in Obesity, and The Effectiveness of Obesity Interventions. Each topic is guided by corresponding questions. The goal is for students to be able to answer these questions by the end of the unit, using evidence from primary research, media sources, and literature. The class is structured to be highly engaging and collaborative. Students will use the class time to discuss assigned readings and work together to complete different assignments and activities. The in-class assignments encourage students to integrate different concepts learned in the course. They were designed to be applicable to real-life scenarios, such as scientists designing obesity research studies or pharmaceutical companies investigating new obesity therapies. Over the course of the term, students will participate in a community-based “Social Impact” project. This component of the class will allow students to apply the information they are learning to promote health and obesity prevention within the community. At the end of the course, students will explore their own interest through a final research project. The research project will allow students to investigate an unanswered question about obesity that particularly interests them. Overall, our course titled “The Weight Among Us” is designed to feel applicable to real-life. The goal is for students to walk away with a strong understanding of the current state of obesity and what lies ahead.

Disclosures: G.C. Herron: None. A.S. Clark: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.07SU/CC63

Topic: J.02. Teaching of Neuroscience

Support: Engaged Undergraduate Research Grant, Cornell University

Title: Get to know your brain days: Agency through neuroscience learning

Authors: *C. CAMMARATA, K. RATNER, A. BURROW, A. K. ANDERSON, E. D. DE ROSA;
Cornell Univ., Ithaca, NY

Abstract: Schoolchildren are asked to use their brains every day, but rarely taught about the brain, especially not in ways that convey personal agency. We used neuroscience lessons to communicate either growth mindset or purpose in life framing to elementary school children and compared these interventions' effect on academic achievement. We designed and executed interactive, age-appropriate neuroscience lessons that were delivered during monthly *Get to Know Your Brain Days* at the Syracuse Academy of Sciences, a public charter school serving inner-city children in Syracuse, NY. We delivered lessons to 390 Kindergarten - 4th grade children, divided into three groups: each received the same neuroscience lessons but framing and discussion questions are shaped to emphasize either growth and learning; purpose, goals and identity; or to strictly focus on brain functioning in the control condition. We collected monthly mathematics and English Language Arts test scores to measure academic achievement. Additionally, at short test administered at the end of each lesson assesses students' engagement with the lesson and tests knowledge of simple facts from that lesson, to determine attention to the material.

Disclosures: C. Cammarata: None. K. Ratner: None. A. Burrow: None. A.K. Anderson: None. E.D. De Rosa: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.08SU/CC64

Topic: J.02. Teaching of Neuroscience

Support: Alpert Medical School Student Group

Title: BrainStation: Elementary school neuroscience

Authors: *A. I. MORE¹, J. J. STEIN¹, N. A. STRADA^{1,2}, B. A. PALLANT^{1,2}, A. C. TSUDA¹, J. L. BASSELL^{1,2}, S. T. MERNOFF^{1,2,3};
¹Brown Univ., Providence, RI; ²Alpert Med. Sch., Providence, RI; ³Providence VA Med. Ctr., Providence, RI

Abstract: BrainStation is an interactive, scientific, student-development workshop designed to introduce students to the brain sciences in the earliest years of elementary school. BrainStation's mission is to increase awareness of the brain, mental illness, and neurological disorders systematically by educating children during their early development. The program was started in 2016 and provides free workshops to elementary schools in Rhode Island. BrainStation's first medical school chapter was established in 2018 at Alpert Medical School, and its community outreach is led by medical students, graduate students, and scientist volunteers from Brown University. BrainStation is located in Providence, RI and implements education goals from the

Rhode Island Department of Education and Next Generation Science Standards in its curriculum. Since 2016, BrainStation has reached over 25 elementary schools and over 3,000 elementary school students in Rhode Island. This systematic program is an ideal education platform to inspire new students with the possibilities and potentials of brain science. It also provides an opportunity for medical students, graduate students, and scientists to gain valuable teaching experience and interact with the wider community in which it operates. This past year, BrainStation's curriculum has expanded to include after-school programs and community STEM nights in addition to routine classroom visits. In the next year, BrainStation will continue to expand both state-wide and regionally to reach a wider audience in the effort to mentor and educate children systematically in neuroscience-related fields.

Disclosures: **A.I. More:** None. **J.J. Stein:** None. **N.A. Strada:** None. **B.A. Pallant:** None. **A.C. Tsuda:** None. **J.L. Bassell:** None. **S.T. Mernoff:** None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.09SU/CC65

Topic: J.02. Teaching of Neuroscience

Title: K12 students want to learn about neuroscience

Authors: ***A. M. EISEN**, C. M. GRANT-HOWARD, J. BENEFIEL, J. SCHMIDT, M. CHAPEK, M. LERNER, R. GARDUNO, J. URIARTE-LOPEZ, H. HAMILTON, A. KIERSARSKY, L. SUMRALL;
Psychology, Portland State Univ., Portland, OR

Abstract: The Neuroscience Club at Portland State University actively works to enrich local communities with taxpayer-supported neuroscience research. Our members devote their time and effort into bringing education, art, and enthusiasm to our community. A primary focus of our outreach is directed at K-12 public schools, to give students opportunities to interact with science in ways they might not necessarily have had. We base our outreach on open inquiry and tie in elements of philosophy for children. The students have the opportunity to guide their learning, which captures their enthusiasm and engagement for the subject. We have found the students maximize their learning when given the opportunity to ask open-ended questions in a supportive and understanding environment, prompting forth questions filled with both complexity and creativity that could baffle even the most experienced neuroscientists. Students engage the world around them and through the exploration of neuroscience, often draw upon personal experience to connect with others and stimulate thought. Through this process, they can better understand themselves and the world around them. Students use the medium of art to support their understanding of advanced concepts guided by their creativity and physical engagement with the

content. Students screen-print works of neuronal art and twist pipe cleaner neurons to life, teaching them ways to engage with science through art while enhancing their understanding of the subject in a hands-on fashion. This poster was inspired by questions collected during an outreach event at North Middle School in Grants Pass, OR. These questions represent common student inquiries from our community outreach events. Although the Neuroscience Club initially focused on students, the club has since expanded its reach to include more diverse populations. The Neuroscience Club's objectives include nourishing the future generation of scientists and artists while allowing education to be fun and engaging and have a place to flourish in diverse communities.

Disclosures: **A.M. Eisen:** None. **C.M. Grant-Howard:** None. **J. Benefiel:** None. **J. Schmidt:** None. **M. Chapek:** None. **M. Lerner:** None. **R. Garduno:** None. **J. Uriarte-Lopez:** None. **H. Hamilton:** None. **A. Kiersarsky:** None. **L. Sumrall:** None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.10SU/CC66

Topic: J.02. Teaching of Neuroscience

Title: Trainingspace neuroeducation without borders

Authors: ***M. B. ABRAMS**, M. SANDSTRÖM, L. JOHANSSON, P. GEORGE;
INCF, Stockholm, Sweden

Abstract: TrainingSpace (TS) is an online hub that aims to make neuroscience educational materials more accessible to the global neuroscience community developed in collaboration with INCF, HBP, SfN, FENS, IBRO, IEEE, BD2K, and iNeuro Initiative. As a hub, TS provides users with access to:

1. Multimedia educational content from courses, conference lectures, and laboratory exercises from some of the world's leading neuroscience institutes and societies
2. Study tracks to facilitate self-guided study
3. Tutorials on tools and open science resources for neuroscience research
4. A Q&A forum
5. A neuroscience encyclopedia that provides users with access to over 1.000.000 publicly available datasets as well as links to literature references and scientific abstracts

Topics currently included in TS include: general neuroscience, clinical neuroscience, computational neuroscience, neuroinformatics, computer science, data science, and open science. All courses and conference lectures in TS include a general description, topics covered, links to prerequisite courses if applicable, and links to software described in or required for the course, as well as links to the next lecture in the course or more advanced related courses. In addition to providing resources for students and researchers, TS also provides resources for instructors, such as laboratory exercises, open science services, and access to publicly available datasets and models. To learn more about TrainingSpace, see: <https://training.incf.org/>

Disclosures: M.B. Abrams: None. M. Sandström: None. L. Johansson: None. P. George: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.11SU/CC67

Topic: J.02. Teaching of Neuroscience

Support: This work was supported by Washington University and annual Society for Neuroscience chapter grants.

Title: Brain discovery: Impacts of a school-based neuroscience outreach program

Authors: *C. T. WEICHSELBAUM, B. V. LANANNA, E. D. HERZOG;
Washington Univ. in St. Louis, St. Louis, MO

Abstract: Brain Discovery is a school-based science outreach program run by graduate students at Washington University in St. Louis. This initiative brings working neuroscientists into local 4th-6th grade classrooms to lead the students in a six-week series of experiments and hands-on activities, allowing them to experience the scientific process while learning about the brain and nervous system. In contrast to many outreach programs that consist of a single event or presentation, Brain Discovery is designed to maximize the benefits of longer-term mentorship while balancing the time constraints of busy volunteers. In addition, we focus on upper elementary students, a critical age at which children are forming beliefs about their interests and capabilities in STEM fields. To measure our impact, assessments of student knowledge and attitudes toward science are collected before and after the program, as well as feedback from teachers, administrators, and participating scientists. As of spring 2019, we have reached over 1200 students across 60+ classrooms, with 40 trained volunteers providing a total of more than 700 teaching hours. Here we present data from the first four years of the program, demonstrating our positive impact on both neuroscience knowledge and attitudes toward science more broadly. Surveys of volunteers and school personnel further suggest a valuable experience for all

stakeholders. We present this program as a promising model for other scientists wishing to have a measurable impact on STEM interest in their local communities.

Disclosures: C.T. Weichselbaum: None. B.V. Lananna: None. E.D. Herzog: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.12SU/CC68

Topic: J.02. Teaching of Neuroscience

Title: Brain outreach day as a form of project based learning in an upper level neuroscience elective course

Authors: *D. M. CURLIK, II;

Psychology, York Col. of Pennsylvania, York, PA

Abstract: Project-based learning is a valuable tool for improving student interest, engagement, and learning, both in and out of the classroom. In order to implement project-based learning in an upper-level neuroscience elective course, a partnership was formed between York College of Pennsylvania's Psychology Department and Jackson Elementary school, a local Elementary School in York City, Pennsylvania. At the beginning of the academic term, York College undergraduates met with the Site Coordinator for Jackson Elementary, and through this meeting learned about the need for improved science education in Jackson Elementary. As a result of this meeting, students developed a strong interest in facilitating science education in York City schools. In order to accomplish this goal, the York College Undergraduates created and implemented a series of brain awareness outreach activities, designed to teach local 5th-grade students about the interaction of the brain and behavior. Throughout this process, students were divided into groups, with approximately four students per group. Each group submitted distinct proposals for their outreach activity, including the name, topic, learning outcomes, materials, and methods for their project. A proposed topic was chosen for each group, and the groups then worked throughout the term to create lesson plans, rehearse their demonstration lessons, and ultimately deliver engaging and insightful lessons to fifth-grade students from Jackson Elementary. Final outreach activities taught the fifth graders about how the nervous system communicates electrically, how our brain processes and integrates various senses, and how cerebrospinal fluid helps protect the brain from concussion. Following these outreach demonstrations, all students returned to the laboratory space, and York College undergraduates taught the fifth-grade students basic neuroanatomy using sheep brains. The day concluded with a shared meal in the York College cafeteria. Overall, the event was highly successful in meeting myriad learning outcomes for undergraduate psychology majors, as set forth by the American Psychological Association. These goals included developing a working knowledge of core

biopsychology domains, exhibiting effective communication skills, enhancing interpersonal relations, and incorporating multiple levels of complexity (cellular, individual, etc.) in order to explain behavior. Moving forward, this outreach will be conducted annually, and opportunities for expanding it through inclusion of additional actives and collaborations are being explored.

Disclosures: D.M. Curlik: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.13SU/CC69

Topic: J.02. Teaching of Neuroscience

Title: Perspectives in mental illness: A course to help freshman engage with complexity

Authors: *L. E. STEPANEK;
American Univ., Washington, DC

Abstract: Higher education policy experts and employers claim that many college graduates lack analytical skills, the ability to identify and solve problems, and ethical reflection. To address these concerns, American University began redesigning its core curriculum in 2016. The new curriculum highlights metacognition, engaging with complexity, and valuing diversity. One component of the new curriculum is “Complex Problems”, a required first-year special topics seminar centered in living-learning communities. This poster describes “Perspectives in Mental Illness”, a Complex Problems course that explores not only the scientific basis for mental illness and treatment, but also how cultural, political, and economic forces impact mental health policy. Students read and respond to narratives by those with mental illness, clinical and legal case studies, scientific review articles and congressional testimony. The course takes advantage of the university’s location in Washington DC to invite policy experts as speakers. Students identify their congressional representatives and meet with their staffers on Capitol Hill. Student attainment of learning objectives is measured by several types of formative assessment, as well as a pre-post comparison of answers to the question: “why is mental illness a complex problem?” Students also provide anonymous formative and summative feedback. Students showed gains in considering multiple perspectives and identifying appropriate sources to support their arguments. However, they struggled to identify or engage with diverse perspectives that were not presented in class, and to put texts into conversation with other texts. Participants appreciated visits to Capitol Hill but felt that many other co-curricular activities were an extra burden. Many students preferred hearing individual stories of struggle than expert description of policy issues, and wanted to learn more about causes and treatments of specific mental illnesses. A long-term assessment of student gains would be helpful to determine if this course is serving its purpose.

Disclosures: L.E. Stepanek: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.14SU/CC70

Topic: J.02. Teaching of Neuroscience

Title: Neuroscience at Lake Forest College: A model for student organizations' contributions to academic experience

Authors: *E. MRACKOVA, Y. GANEV, D. SYCHOWSKI, D. BERNINZONI, A. BALARAM, M. KELLEY, S. DEBBURMAN;
Neurosci. Program, Lake Forest Col., Lake Forest, IL

Abstract: As undergraduate neuroscience programs grow nationwide, a common challenge is how dual academic student organizations, one that is an honors society and the other typically older group that is not, can co-exist and thrive to provide co-curricular support. The Neuroscience Program at Lake Forest College was founded in 2009, immediately becoming associated with two such student-led organizations. Synapse, focused on interdisciplinary outreach, was founded first in 2009. The Lake Forest College chapter of Nu Rho Psi, the National Honors Society in Neuroscience, was chartered in 2011. Both quickly gained rapid recognition, on-and off-campus, with Synapse winning the inaugural 2011 National Society for Neuroscience Brain Awareness Week Award and Nu Rho Psi becoming the inaugural 2013 National Chapter-of-the-Year. Though we are distinct, our combined and collaborative goals are to: 1) focus on students' career and professional interest development, 2) raise public awareness on urgent issues of neuroscience, and 3) give back to the community. Towards the first goal, we annually organize two symposia: the first highlighting undergraduate research conducted in faculty labs and the other highlighting capstone experiences in inquiry-driven courses. We also organize an annual academic excursion to the Chicago Chapter Society for Neuroscience meeting. To raise public awareness, Synapse organizes an annual Brain Awareness Week each fall that connects academic work from multiple courses, interdisciplinary lectures, and popular culture including faculty-led movie panels that showcase neurological conditions. Nu Rho Psi holds an annual public seminar series featuring national experts drawing from the Chicago area and beyond. To support younger generations, both organizations conduct K-6 outreach each semester that has already impacted over 500 children. Since 2017, Nu Rho Psi has organized the Chicago Brain Bee (one of the oldest regional bees in the nation). Finally, we work to give back to the community. Our members volunteer at nonprofit organizations that focus on providing services to adults with developmental disabilities. We annually participate in the Chicago Walk to End Alzheimer's, raising over \$4,000 each year. Overall, our combined histories and success

as organizations, with focused complementary goals, have positively contributed and strengthened the common mission of the Neuroscience Program and College community that we serve, but not without challenges of collaborative division of organizational responsibilities and the natural ebbs and flows of student leadership, especially in programs that recruit from a smaller pool of students.

Disclosures: **E. Mrackova:** None. **Y. Ganey:** None. **D. Sychowski:** None. **D. Berninzeni:** None. **A. Balaram:** None. **M. Kelley:** None. **S. DebBurman:** None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.15SU/CC71

Topic: J.02. Teaching of Neuroscience

Title: An undergraduate minor in neuroethics: Innovation in neuroscience education

Authors: ***G. E. HUE**, P. R. LENNARD;
NBB, Emory Univ., Atlanta, GA

Abstract: Neuroethics focuses on the ethical, legal, social, and policy implications of advances in neuroscience. Neuroethics is interdisciplinary by nature and the field is driven by a multidisciplinary approach. It treats the ethicality of the advances in the brain sciences, e.g. the BRAIN Initiative, with its commitment to the development of new research tools and technologies, will generate many important ethical questions related to the conduct and use of neuroscience research. Equally relevant in the scholarship of the discipline is the branch y concerned with the neuroscientific research areas that explore matters of ethical import including, but not limited to, how humans make decisions and engage in moral thought. Concerns about neuroethics and the need for its integration into the practice of neuroscience have been recognized at the highest levels of training and research. Here we describe our proposal for an undergraduate minor in Neuroethics in a neuroscience program. Neuroscience and Behavioral Biology (NBB) is an interdisciplinary degree-granting undergraduate program created in 1997 by members of the departments of Anthropology, Biology and Psychology at Emory College of Arts and Sciences (ECAS). Beyond the rigorous four-course core sequence, NBB exposes all majors to the concepts and methodologies of the interdisciplinary field of NBB. The neuroethics minor is an academic innovation that formalizes what many ECAS students have done in recent years, namely being intentional about creating an academic experience that allows them to focus on Neuroethics. In the past our students have designed their curricular experiences with an informal, unrecognized concentration in neuroethics, and have selected from course offerings in NBB, Anthropology, Biology, Human Health, Psychology, Women's, Gender, and Sexuality Studies (WGSS), as well as graduate courses offered through the Master of Arts in Bioethics (MAB)

program. The minor proposal draws on existing core courses and electives, but includes novel curricula that leverages available resources and will engage faculty from the College and the Center for Ethics. Neuroethics has been recognized globally and is one of the top priorities for the International Brain Initiative (IBI), a consortium of 7 national-level brain research projects around the globe. Neuroethics education is a top priority within the IBI's neuroethics efforts. Neuroethics is a field born out of neuroscience, thus critical knowledge of neuroscience is needed to engage deeply and practically with neuroethics. The Neuroethics minor, meets the needs of students focused on applied and practical uses of advances in neuroscience.

Disclosures: G.E. Hue: None. P.R. Lennard: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.16SU/CC72

Topic: J.02. Teaching of Neuroscience

Title: A paradigm for integrating neuroscience into small liberal arts colleges

Authors: *Q. WANG;

Biol., John Brown Univ., Siloam Springs, AR

Abstract: At John Brown University, a small liberal art college, neuroscience is not offered as a degree track or an established course, except some content about neuroscience in psychology courses. However, a good number of students have shown great enthusiasm about neuroscience: biology, biochemistry, chemistry, nursing, engineering, psychology, arts, film, music and philosophy students. Ideas of neuroscience are presented in student clubs such as Faith United with Science and Engineering (FUSE) and Psi Chi, as well as in students' independent study projects. As a newly recruited faculty member and the only one who specializes in neuroscience, besides the initiation of a research lab and a potentially long-term neurobiology course (currently a selective topic course for biology students), I strive to integrate neuroscience into other vibrantly ongoing disciplines on campus. My current efforts include: (1) Invite faculty members as guest speakers to the neurobiology course to demonstrate how neuroscience is related to their disciplines. (2) Reach out to more student clubs with my own and students' effort of presentations to inspire an interest in neuroscience in the students' own majors. (3) Take advantage of the honor's program, especially a 1-credit honor's seminar where any topic is free to be discussed, offered by selected faculty members. (4) Offer a neuroscience perspective to the integration programs on campus, such as our new Center for Faith and Flourishing. With such effort, my hope is to meet the needs of the students who are interested in neuroscience and increase the awareness of neuroscience in other disciplines, with the advantage of a small liberal art college where many integrated academic activities take place.

Disclosures: Q. Wang: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.17SU/CC73

Topic: J.02. Teaching of Neuroscience

Title: Design of a project-based course that integrates neuroethology with physics of the natural world

Authors: *A. C. BASU, T. NARITA;
Col. of the Holy Cross, Worcester, MA

Abstract: Increased integration of physics into life science courses and/or the development of physics courses for life science students are potential long-term means to increase integration of physics and life sciences. We have designed an intermediate-level undergraduate neuroscience course that uses a project-based learning approach to guide integrative thinking in the practice of scientific inquiry. The course will be co-taught by a neuroscientist and a physicist and emphasize inclusive pedagogy in instruction, including a combination of active learning methods. Students will be introduced to the diversity of neural systems underlying natural behaviors and learn basic physics concepts about electricity and magnetism just-in-time to deepen their learning. The first project module will focus on specialized “superpower” senses (*e.g.*, UV and infrared vision, electroreception, and magnetoreception). The second project module will focus on neural circuits governing adaptive behaviors (*e.g.*, specialized feature detection, echolocation, dynamic camouflage, sex-switching). In the third project module, which will be initiated at the beginning of the course and become the main focus for the last unit, students will generate scientific hypotheses, propose experiments using an integrative approach, collect preliminary data to evaluate research directions, and communicate their proposals in oral and written form. The planned theme for this third module is honeybee hive collapse: Student beekeepers on campus maintain a honeybee colony that collapses each winter. Are there seasonal changes in environmental exposures (*e.g.*, temperature, humidity, polarized light) and honey bee behavior, detectable by quantitative analysis, which could account for the annual collapse? What neural systems are implicated? Throughout the course, introductory source materials, seminars on module topics, supplementary mini-lectures, homework exercises, and project feedback will be provided by faculty as needed. The learning objectives are that students will: think integratively, apply knowledge and tools from multiple disciplines to the understanding of complex questions; generate hypotheses to explain natural phenomena; design, carry out, and interpret results of experiments to test hypotheses; and gain proficiency in basic principles of neuroscience, biology, and physics.

Disclosures: A.C. Basu: None. T. Narita: None.

Theme J Poster

023. Outreach and Curricula

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 023.18SU/CC74

Topic: J.02. Teaching of Neuroscience

Title: On teaching environmental neuroscience and protection from "dual-use" technology: Toward an inclusive and ethical curriculum

Authors: *P. W. TSANG¹, A. LAM², E. L. OHAYON²;

¹Univ. of Toronto, Toronto, ON, Canada; ²The Green Neurosci. Lab., NeuroInx Res. Inst., San Diego, CA

Abstract: While it is widely recognized that the development and adoption of codes of conduct along with education and awareness are important in preventing the misuse of science and technology, the inclusion of environmental and "dual-use" issues in most neuroscience education has been limited or non-existent. In particular, issues relating to the bioethics of "dual-use" are almost entirely absent in postsecondary curricula and other forms of neuroscience research training. There are also many cases where research and findings presented as basic discovery, and/or for human health and peaceful purposes are either funded by military and/or usurped for such applications. Similarly, neuroscience research intended for human health often has the opposite effect with negative environmental consequences. Here we present the need for a novel approach to university-level neuroscience that considers ethical dimensions. We begin by articulating the theoretical bases of such a curriculum in the context of theoretical works in Science, Technology, Society and Environment education (STSE) and Socio-scientific Issues (SSI). We demonstrate how the questions raised relating to "dual-use" technologies spans many dimensions that have immediate application in the laboratory. For example: freedom of inquiry of individual researchers; the importance of open access to methods and findings through conferences and publications; and the importance of knowledge production and scientific advances for the neuroscience discipline and society. These issues raise important questions regarding appropriate guidelines and regulatory mechanisms that can protect researchers, subjects, the integrity of institutions, society at large and the environment. This study also outlines the goals and objectives of an education program including key concepts and principles as well as the application of STSE and SSI pedagogies in generating content, context, rationale and objectives. As such, we outline learning activities and assessment tools that can assist in the development of a critical, ethical and inclusive university-level neuroscience curriculum.

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

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.01SU/CC75

Topic: J.02. Teaching of Neuroscience

Title: Student led recaps and retrieval practice presented as a simple classroom activity emphasizing effective learning strategies

Authors: *A. STAVNEZER¹, B. LOM²;

¹Psychology and Neurosci., Col. of Wooster, Wooster, OH; ²Biol. and Neurosci., Davidson Col., Davidson, NC

Abstract: To prepare the next generation of scientists for the challenges ahead, it is imperative that college and university faculty continue to collaborate to develop and assess innovative teaching methods that effectively encourage learning for all undergraduates, particularly in STEM. As part of such efforts we have developed a simple student-led classroom technique, recap and retrieval practice (R&RP). We collaboratively implemented R&RPs in three upper-level STEM courses, each with significant neuroscience content, at two institutions. R&RP sessions are short (5-10 minute), in-class, student-led reviews of course material from previous class sessions. As such, R&RPs feature student voices prominently at the start of every class period to review prior course material in active ways. In each R&RP session a duo or trio of students prepares and then delivers a recap of prior course content to their classmates via active, low-stakes retrieval practice formats such as quizzes and games, which are well known to be particularly effective learning tools. These R&RP assignments are also designed to emphasize student use of additional evidence-based practices (concrete examples, dual coding, elaboration, interleaving, and spaced practice) also demonstrated to be successful learning strategies. Our assessment of student experiences both in leading and participating in R&RPs, as well as their knowledge of learning strategies, indicates that R&RP sessions were well-received, active learning strategies that our students indicated they appreciated and found helpful to their learning. Ninety-five percent of the students reported that leading a R&RP (which they did at least twice) helped them learn the material, and 82% reported that their learning was improved when they were audience members. Importantly, students felt they owned the responsibility for R&RP, strongly preferring the option of student-led over instructor-led R&RPs. As instructors, we found R&RPs to be an efficient strategy that effectively encouraged class participation by all students, allowed us to assess class participation objectively, introduced students to evidence-based learning strategies, and most importantly emphasized student voices at the start of every class session. Moreover, we experienced that collaboratively deploying a learning activity allowed us to observe the impact of a specific pedagogical activity in varied instructional settings and enhanced our professional development as educators. Our data will demonstrate that student-

led R&RP are a simple, flexible, and easily implemented small teaching strategy that powerfully engages students in their learning.

Disclosures: **A. Stavnezer:** None. **B. Lom:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.02SU/CC76

Topic: J.02. Teaching of Neuroscience

Support: JMU Department of Biology

Title: Backward design of a writing-intensive and primary literature-based neurotechniques course at the undergraduate/master's level

Authors: ***G. S. VIDAL;**

James Madison Univ., Harrisonburg, VA

Abstract: A new course entitled “Understanding Techniques in Neuroscience” was taught at James Madison University as a 400/500-level biology/neuroscience elective. An overarching goal for undergraduate STEM education is to provide students with a solid foundation in scientific literacy, including analyzing primary literature, developing appropriate hypotheses, communicating science to varied audiences, and understanding the social structures involved in the conception, production, and dissemination of scientific data. Thus, the selection of content for this neuroscience techniques course stemmed from a desire to improve student outcomes in these forms of scientific literacy and communication. The course was open to all undergraduate and master's students at James Madison University who had completed basic biology coursework, though the class roster comprised mostly junior and senior biology majors. The content of the course was aligned to a series of student learning objectives defined by the various techniques tying together various neuroscience subfields (e.g. whole brain imaging, behavioral assessments, manipulation of neural activity). This alignment of class activities to course objectives utilized the principle of “backward design”. As a result, most classroom time was devoted to in-depth discussion of primary literature as well as grant writing exercises that mimicked NIH requirements and review practices while providing a broad area for student creativity. Students became responsible for understanding techniques in neuroscience to a level at which they could design a series of experiments that would address a human health topic. Results show that students gained significant skills in scientific design and written communication, and improved attitudes and confidence toward scientific primary literature and scientific writing.

Disclosures: G.S. Vidal: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.03SU/CC77

Topic: J.02. Teaching of Neuroscience

Support: Grass Foundation Educational Outreach Grant
Alford Center for Service Learning, Denison University

Title: Curricular service learning in neuroscience produces positive outcomes for students and community members

Authors: *H. J. RHODES;
Biol. and Neurosci., Denison Univ., Granville, OH

Abstract: Curricular service learning and project-based learning approaches are increasingly popular pedagogical tools to engage students in deep and applied learning. These approaches are often successful at motivating students and developing a range of skills, including communication, collaboration, and problem solving. When based in the community, they also provide scientific outreach to a broader audience. With those goals and potential benefits in mind, undergraduate biology and neuroscience students at Denison University were assigned to develop neuroscience curricula and lab exercises using low-cost electrophysiology tools from Backyard Brains. The undergraduates then trained and supported secondary level teachers to use the Backyard Brains equipment and supplied curriculum for their classrooms, to be used at the time of the projects as well as in the future. The undergraduates worked with educators in two locations: remotely at the Maths & Science Leadership Academy (MSLA) in Kimberley, South Africa, and locally at Newark High School in Newark, Ohio. Undergraduates reported that the outreach project was moderately helpful in mastering course concepts in neurophysiology and very helpful in improving communication skills, confidence, and allowing students to pursue their interests. Some students also reported increased motivation and better quality collaboration than on typical group assignments. Secondary teachers and students who received outreach also reported a high degree of satisfaction with the project. The high school students enjoyed the hands on activities, were excited by the subject matter, and reported a desire to learn more about neuroscience. In the first year, over 300 students and teachers were involved in the project, making this a cost effective outreach effort (total budget was ~\$3000). Participants are currently being surveyed about the continued impacts of the project during the second year, these longer-term outcomes will be also be reported.

Disclosures: H.J. Rhodes: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.04SU/CC78

Topic: J.02. Teaching of Neuroscience

Title: Impulse allows undergraduates to experience neuroscience publishing from submission through manuscript publication

Authors: *C. T. FENNELL, E. B. TURNER, C. H. GODFREY, A. N. TOLLEFSRUD, L. S. JONES, M. C. ZRULL;
Appalachian State Univ., Boone, NC

Abstract: Last year, *IMPULSE - The Premier Undergraduate Neuroscience Journal* was 16 years old. The journal was created in 2003 to allow undergraduates to take an active role in writing and reviewing scientific manuscripts for publication, and it continues to offer undergraduates the same opportunity today. While many undergraduate curricula allow students to gain experience conducting research, writing meeting submissions, producing and presenting posters, and giving talks, many students do not gain experience in the journal submission process until they reach graduate or professional education. *IMPULSE* provides a venue for students to gain extensive experience writing, interacting with journal editors, and doing manuscript revisions during their undergraduate education. *IMPULSE* is an open-access journal indexed within the Directory of Open Access Journals, and authors who submit to *IMPULSE* retain ownership of their manuscript after publication. *IMPULSE* not only allows undergraduates an outlet for publishing their research but offers an enriching experience in peer revision as well. The journal is supported by a peer review process, which is performed by over 100 students across 37 institutions throughout the world and is facilitated through a series of training modules provided on the *IMPULSE* website and a Faculty Advisor (FA). Groups of students at a particular institution meet together to discuss their reviews of submissions with guidance from an FA. These institutions are referred to as Review Training Sites (RTSs). Undergraduates who wish to review for *IMPULSE* but are not at an institution with a review site are assigned to a RTS and work electronically. Each RTS selects an Associate Editor who has the responsibility to compile individual reviews into a single review for the RTS and submit it to the Executive Editor, who is an undergraduate, on the *IMPULSE* editorial board. The Executive Editor compiles RTS reviews into a single document of comments and necessary and suggested edits, which is sent back to the manuscript author(s). Since January 2018, *IMPULSE* has published 11 research papers on various topics in neuroscience, and 44 research articles and 10 review papers have been published over the last 5 years. *IMPULSE* allows undergraduates to become familiar with the process of scientific publishing early in their educational careers. Including *IMPULSE* in undergraduate curricula provides opportunity to effectively prepare students for success in

graduate and professional education by allowing practice and development of writing skills as well as an introduction to the process of submitting neuroscience literature to a scientific journal.

Disclosures: C.T. Fennell: None. E.B. Turner: None. C.H. Godfrey: None. A.N. Tollefsrud: None. L.S. Jones: None. M.C. Zrull: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.05SU/DD1

Topic: J.02. Teaching of Neuroscience

Title: Benefits of collaborative learning in undergraduate neuroscience education

Authors: *T. NEWPHER, M. NG;
Psychology and Neurosci., Duke Univ., Durham, NC

Abstract: Collaborative learning is an evidence-based instructional strategy that facilitates rich discussions between students to deepen student engagement and learning. This pedagogical approach increases learning gains and reduces failure rates among undergraduate students in STEM courses. In addition, student participation, motivation, and self-efficacy can all be increased with these structured learning environments. One such structured, active learning environment is Team-Based Learning (TBL). In TBL, students spend the majority of classroom time applying course content, analyzing data, synthesizing new ideas, and evaluating hypotheses. Importantly, previous studies have shown that learning outcomes and student course satisfaction are higher in courses that use TBL, compared to lecture-based classrooms. To better understand how TBL improves student learning and course satisfaction, we collected end of semester course evaluations and measured student-perceived classroom dynamics, as well as learning of lower and higher order levels of Bloom's taxonomy. Our results suggest that implementation of TBL in an undergraduate neuroscience classroom improves student-perceived learning in both lower order (gaining knowledge, understanding concepts) and higher order (learning to apply and synthesize) levels of Bloom's taxonomy. These increases are consistent with the strong emphasis placed on application and synthesis within a TBL classroom.

Disclosures: T. Newpher: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.06SU/DD2

Topic: J.02. Teaching of Neuroscience

Support: Career Ready Fund (CRF)
Advancing Teaching & Learning in Arts & Science (ATLAS)

Title: The Human Biology Program's 'Lab Bootcamp': An experiential learning program for independent undergraduate research at the University of Toronto

Authors: J. SINGH¹, A. H. M. WONG¹, K. SHAHABI¹, L. F. ZHAO¹, M. A. WOODIN², *C. DOCKSTADER¹;

¹Human Biol. Program, ²Cell & Systems Biol., Univ. of Toronto, Toronto, ON, Canada

Abstract: Approximately half of Ontario undergraduate life science students do not experience a work-integrated learning opportunity before they complete their studies. Recent graduates and their new supervisors often report that students are not adequately prepared to work in a research setting. The Human Biology Program (HMB) at The University of Toronto designed and conducted a two-week intensive experiential learning program, called 'Lab Bootcamp', for life science undergraduates in May 2018 (n=22) and May 2019 (n=54). The Bootcamp reflected the experience of an independent project in a molecular biology research setting. Small students groups (~4 students/group), each mentored by a senior graduate student, were challenged to research and develop an optimal experimental strategy for directly addressing a research objective given to them. They were told to consider the sensitivity of their strategy, time required to perform it, and limitations of their approach. Students began each day with a director-led discussion regarding agenda and goal setting, and ended each day with a student-led discussion of key results and experimental troubleshooting. In addition to wet-lab procedures, students participated in workshops in biosafety, data analysis, research ethics, biotechnology, and resume/CV building. At the end of two weeks students presented the culmination of their work in group-based oral presentations. Course surveys immediately following Bootcamp, as well as at a 4-month follow-up, indicated that students found that their technical and critical-thinking skills substantially increased, as did their communicative and collaborative skills. Unexpectedly, students rated an increased confidence in conducting research the highest of all indices evaluated. Following Bootcamp 2018, 2 of 4 graduating students went on to continue in research. For 18 students entering their final undergraduate year, 7 students were hired in work-study positions and 5 conducted independent research projects. Bootcamp 2019 data from 54 students will be evaluated soon. We conclude that the HMB Lab Bootcamp format offered life science undergraduates an effective experiential learning environment by empowering students to acquire skills and confidence in an inquiry-based research setting.

Disclosures: J. Singh: None. A.H.M. Wong: None. K. Shahabi: None. L.F. Zhao: None. M.A. Woodin: None. C. Dockstader: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.07SU/DD3

Topic: J.02. Teaching of Neuroscience

Support: Medical Faculty Tuebingen (PROFIL program)

Title: Audience response systems and other modern teaching methods to improve student learning and perception

Authors: ***T. SCHMIDT**¹, **K. SCHNABEL**², **U. MAU-HOLZMANN**¹;

¹Med. Genetics, Univ. of Tuebingen, Tuebingen, Germany; ²Dept. for Educ. and Media (AUM), Univ. of Bern, Bern, Switzerland

Abstract: Major parts of University or College education is still given in form of classical teacher-oriented lectures. However, from a learning-physiological point of view, this form of instruction is inefficient, as without repetitions, students will forget more than half of what they have just learned within minutes. Another aspect contributing to this issue is that students usually behave passively while listening to lectures. An active or even interactive mode of engagement is typically not achieved in classical lectures. In order to counteract this dilemma, we have integrated modern teaching methods such as audience response systems and an inverted or flipped classroom into our classes in Neurogenetics and related fields. We evaluated the implementation using a 6-point Likert Scale survey: We asked the students for their previous experience with these methods and for their impression regarding motivation, engagement and perception.

Most students did not yet know these modern teaching methods from other courses, but assessed their use very positively and would prefer their integration into additional courses as well. They had no technical difficulties using these teaching methods and felt stronger engaged and better motivated to deal with the respective topics. We were pleased how well these modern teaching methods were accepted by the students.

However, a better motivation, an increase engagement or higher satisfaction with the classes do not necessarily mean that the applied teaching methods improve the student's learning and perception. In order to assess this point, we further analyzed the student's performance in summative assessments regarding the use of modern teaching methods like audience response systems and inverted / flipped classroom in their classes.

Our results will help us understanding both the relevance and impact of modern teaching methods like audience response systems and inverted or flipped classroom approaches.

Disclosures: **T. Schmidt:** None. **U. Mau-Holzmann:** None. **K. Schnabel:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.08SU/DD4

Topic: J.02. Teaching of Neuroscience

Title: Students' perception about their teaching-learning process in neurophysiology after the use of a game as a ludic practice

Authors: *L. P. GUTIERREZ¹, A. F. GUIMARÃES², C. S. MARTINS², A. G. P. NUNES², M. PORAWSKI³;

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Abstract: Background: Ludic practices are important in education, because through the fun it is possible to develop skills and make conditions of knowledge construction, introducing pleasure, motivation, initiative and creativity. Thus, the Neurophysiology game is a board game that was developed by this group and it is used to support the understanding of theoretical classes.

Objective: The aim of this study was introduce ludic practices in the teaching of Neurophysiology in health courses and to evaluate the students' perception in their teaching-learning process. Methods: The data were collected from an exploratory survey using convenience sampling (students who accepted to participate voluntarily), after completing the Neurophysiology module (which occurred from February to April 2019), in the Physiology disciplines of the Pharmacy, Medical Chemistry and Medical Physics courses of Federal University of Health Sciences of Porto Alegre (Brazil). As a supplement to the traditional lecture-based class, the students experienced the Neurophysiology game that consisted of a paperboard, dice and paper cards with questions about the central, peripheral and neurovegetative nervous system. Students were divided into groups and the game took place for 60 minutes, reviewing content and solving doubts in an interactive and dynamic way. The students threw the dice and answered questions about Neurophysiology, advancing on the board according to their correctly answering. The first group to complete the board was the winner. After this, a questionnaire was applied with closed questions to evaluate the students' perception regarding the use of LP in learning. The data obtained were organized in Excel® (version 2010), described in absolute frequency and percentages. This research was approved by the Research Ethics Committee (CAE 82851518.3.0000.5345). Results: The sample consisted of 53 students. Preliminary data shows that 93,2% of the students judged that the use of Neurophysiology game were great or very good and 3,8% of the students found that practice to be good. Few students reported discomfort and diffidence feelings when the activity was proposed (5,6%). Most students (69,8%) preferred ludic activities than lecture-based classes, 22, 7% of students said they learn equally well with both methodologies and 7,5% of students said they learn best with lecture-based classes. Conclusion: These positive results express the value of using ludic practices as an additional tool in combination with the theoretical lecture-based classes for the

study of the Neurophysiology. Finally, because of its low cost for elaboration, this game can be used in developing countries.

Disclosures: L.P. Gutierrez: None. A.F. Guimarães: None. C.S. Martins: None. A.G.P. Nunes: None. M. Porawski: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.09SU/DD5

Topic: J.02. Teaching of Neuroscience

Title: Active learning adoption in a traditional lecture-based motor control course

Authors: *M. WILSON¹, Z. A. RILEY²;

¹Indiana Univ. Purdue Univ. Indianapolis, Indianapolis, IN; ²Indiana Univ. Purdue Univ. at Indianapolis, Indianapolis, IN

Abstract: Lecture-based teaching methods have been used at the collegiate level for years. Although this style has been effective, research has shown that it is falling short for the present and future generations of students. The rise of technology, as well as the increase demand for academic performance, has led educators to shift from lecture-based teaching to student-centered learning experiences or “active learning” (DeWitt, 2019). Active learning is a method of teaching that engages students to apply, analyze, and evaluate the material they have been given, thereby improving outcomes. In this study we implemented an active learning module into an undergraduate, senior-level motor control course at IUPUI. To do this, we incorporated four discussion board assignments via Canvas (a reporting system for students grades that allows for professor/student and student/student discussion and social networking). 46 students were divided into groups of 3-4 students and were asked to produce 500-word essays on topics that were being covered in each unit throughout the course. In addition to the essays uploaded to the discussion boards, students were required to produce 3 comments on each discussion board topic to generate discussion. Notecards were also implemented and given on the first day of class and the last day of class to assess the students learning styles, as well as if they felt that the incorporated active learning enhanced their overall learning experience. We used course grade averages from the previous semester (lecture-based) to compare to the semester that had active learning. We found that there was no significant difference between class average GPA’s for the two semesters recorded. However, the notecard review showed that 30 of the 36 students believed their overall learning experience improved with the use of discussion boards. We would need many semesters of empirical data to determine if the implementation of active learning is impacting GPA, though the feedback from the students leads us to believe this is a promising step in the right direction, with minimal impact on teaching delivering time and resources.

Disclosures: M. Wilson: None. Z.A. Riley: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.10SU/DD6

Topic: J.02. Teaching of Neuroscience

Support: UCLA Center for the Advancement of Teaching Grant #18-08

Title: N.E.U.R.O. test v. 2.0: Assessing an entire neuroscience curriculum for learning gains

Authors: *W. E. GRISHAM¹, H. WHANG², W. E. BABIEC³, N. SCHOTTLER¹, M. LEVISO-FITZGERALD²;

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Abstract: Most tests of learning gains assess a single aspect of a course or just a single course. The N.E.U.R.O.—Neuroscience Evaluation of Undergraduate Realized Outcomes test, in contrast, is being developed to assess an entire Neuroscience Major at UCLA and the learning gains achieved as students traverse the curriculum. With version 1.0, we established that we had a test with high reliability that showed differences between first year students and fourth year students, and that the test predicted grades in the major when examined retrospectively.

The test is now a 45 question, 5-item per question, multiple choice test plus one open ended question. Questions covered neuroanatomy, neurophysiology, cognitive neuroscience, developmental neuroscience, molecular neuroscience, neuropharmacology, and statistics/data interpretation. Some of the test is based on the Neuroscience Pre Test, with some modification by UCLA faculty. Version 2.0 sought and incorporated further faculty input, and also brought the items into better alignment with the UCLA Neuroscience program goals and expected learning outcomes.

With version 2.0 our goals were to 1) expand the number of items, which should increase the reliability of the test, 2) Revise items from version 1.0 for wording and comprehension, 3) See if differences due to students' experience with the curriculum were maintained 4) See if version 2.0 can detect changes in learning gains due to a single course, 5) Check the validity of revised test for predicting performance within and across courses.

Expanding the test item number from 31 to 45 increased reliability from a Cronbach $\alpha = 0.720$ to 0.804 and 0.844 on the pretest and posttest, respectively. Posttest scores significantly correlated with grades once the course was completed (range 0.461-0.603).

Advanced students scored better than first year students, showing that experience with the curriculum increases test scores. Pre- and posttest scores were significantly different in three of the four classes, showing that the test is sensitive enough to detect learning gains in a single

course.

N.E.U.R.O. v.2.0 shows great promise for to be used to evaluate an entire curriculum. Its sensitivity in differentiating students due to experience suggests that it truly is measuring learning gains. Thus, it can be diagnostic for examining the efficacy of individual courses or the curriculum as a whole. Further, scores on this test can be disaggregated to ascertain if the curriculum is serving students equally across all demographics.

Disclosures: **W.E. Grisham:** None. **H. Whang:** None. **W.E. Babiec:** None. **N. Schottler:** None. **M. Levis-Fitzgerald:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.11SU/DD7

Topic: J.02. Teaching of Neuroscience

Support: IBRO Global Advocacy Grant
United States Department of State S-BL400-17-IN0055
United States Department of State S-BL400-16-IN0017
United States Department of State S-BL400-15-G102
United States Department of State S-BL400-18-IN0037

Title: Effective participatory science education in a diverse Latin American population

Authors: ***M. A. MOSTAJO-RADJI**, L. M. R. FERREIRA, G. A. CAROSSO, B. LOPEZ-VIDELA, N. MONTELLANO DURAN, S. BOHORQUEZ-MASSUD, G. VACA DIEZ, L. RIVERA-BETANCOURT, Y. RODRIGUEZ, D. G. ORDONEZ, D. K. ALATRISTE-GONZALEZ, A. VACAFLORES, L. GONZALEZ AUZA, C. SCHUETZ, L. E. ALVARADO-ARNEZ, C. V. ALEXANDER-SAVINO, O. GANDARILLA CUELLAR;
Clubes de Ciencia Bolivia Fndn., Santa Cruz, Bolivia, Plurinational State of

Abstract: Particular challenges exist for science education in the developing world, where limited resources require curricula designed to balance state-of-the-art knowledge with practical and political considerations in region-specific contexts. Project-based biology teaching is especially difficult to execute due to high infrastructural costs and limited teacher training. Here, we report our results implementing short, challenging, and low-cost biology courses to high school and college students in Bolivia, designed and taught in collaboration between scientists from developed nations and local science instructors. We find our approach to be effective at transmitting advanced topics in disease modeling, microscopy, genome engineering, neuroscience, microbiology, and regenerative biology. We find that student learning through this approach was not significantly affected by their background, education level, socioeconomic

status, or initial interest in the course. Moreover, participants reported a heightened interest in pursuing scientific careers after course completion. These results demonstrate efficacy of participatory learning in a developing nation, and suggest that similar techniques could drive scientific engagement in other developing economies.

Disclosures: M.A. Mostajo-Radji: None. L.M.R. Ferreira: None. G.A. Carosso: None. B. Lopez-Videla: None. N. Montellano Duran: None. S. Bohorquez-Massud: None. G. Vaca Diez: None. L. Rivera-Betancourt: None. Y. Rodriguez: None. D.G. Ordonez: None. D.K. Alatraste-Gonzalez: None. A. Vacaflares: None. L. Gonzalez Auza: None. C. Schuetz: None. L.E. Alvarado-Arnez: None. C.V. Alexander-Savino: None. O. Gandarilla Cuellar: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.12SU/DD8

Topic: J.02. Teaching of Neuroscience

Support: JHU/APL Internal Research and Development

Title: A cohort-based integrated research community for undergraduate leadership, innovation and trailblazing

Authors: M. CERVANTES, M. VILLAFANE-DELGADO, E. C. JOHNSON, M. HUGHES, K. GRAY-RONCAL, M. ENCARNACIÓN, *W. R. GRAY-RONCAL;
Applied Physics Lab., Johns Hopkins Univ., Laurel, MD

Abstract: We target trailblazing, high-achieving students who are facing barriers in accomplishing their goals of becoming research leaders in STEM fields such as computational neuroscience. Examples include those from underserved backgrounds (e.g., first-generation, low-income), underrepresented backgrounds (e.g., African American and Hispanic students, women), and others with limited exposure to research opportunities or mentoring. These students are often missed in traditional recruitment pipelines, and are at a higher risk of not persisting in research careers. We recruit holistically, including students from all backgrounds, and select students based on their commitment, potential, and need.

It is widely-acknowledged that students from trailblazing backgrounds face many barriers in achieving career success, and attrition is seen throughout the STEM pipeline, making it especially challenging for companies to effectively recruit students at a rate proportional to their prevalence in the broader population. The challenges that trailblazers face are multi-factorial, including knowledge, financial limitations, access to mentors, implicit bias, awareness, confidence, and limited networks. We provide an infusion of resources, confidence, and

knowledge that catalyzes their efforts. We help students to succeed and to become leaders - to redirect their substantial potential and work ethic toward cutting-edge scientific challenges and future career success. We provide an inclusive environment - a presumption of belonging and the associated support - that is often unavailable to trailblazing students.

Critically, we combine intensive outreach, training, and mentoring support of our students with immersion in cutting-edge research problems, with a focus on applied neuroscience, precision medicine, and artificial intelligence applications. Students begin with structured activities, progressing to cohort-based independent research and discovery, as part of a team consisting of professional staff at diverse levels (i.e., new hires and subject matter experts). Their work typically culminates in a peer-reviewed conference or journal publication. Students are supported by professional staff, as well as a rich variety of instructional activities (e.g., recent courses included neuroscience, graph theory, machine learning, robotics, and data science). Now in our third session, we will highlight mission and student training successes from the first two program sessions in applied neuroscience and explain how this model can generalize to additional domains and be expanded to additional student cohorts.

Disclosures: **M. Cervantes:** None. **M. Villafañe-Delgado:** None. **E.C. Johnson:** None. **M. Hughes:** None. **K. Gray-Roncal:** None. **M. Encarnación:** None. **W.R. Gray-Roncal:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.13SU/DD9

Topic: J.02. Teaching of Neuroscience

Title: Teaching to the outliers in biopsychology: Remediation techniques when a class fails

Authors: *S. C. PENLEY;

Psychology, Bridgewater State Univ., Bridgewater, MA

Abstract: In statistics, the sampling distribution of the mean is a theoretical frequency distribution of sample means for all possible random samples of a given size. In theory the mean of the sampling distribution should equal the population mean, but some sample means will be greater, some less. There is variability in our measured means. This can often be observed in the semester-to-semester variation of class performance and occasionally as educators we can experience an outlier, an extreme example of this variation. I reflected on the idea of variation in group performance after the observation that one section of Biopsychology performed significantly worse on the first exam (between 15.5% and 24% points lower) on when compared to both previous and concurrent classes ($F(8,214)=4.012$, $p<.001$, post hoc all $p's<.01$) This led me to the questions: What do you do if a class/sample is an outlier? What do you do if a whole class fails? Using archival data from nine biopsychology classes matched on content, and

assessment techniques, variation of average performance across multiple samples was examined. These outcomes were compared across previous iterations of this class to confirm baseline expectations for performance. Specifically, the purpose of this project was to reflect on the relationship between average performances in matched classes that exhibit very different outcomes following similar instruction and to examine the impact of remediation on the at-risk groups. Here I reflected on how one might recognize if a class/sample is an outlier and discussed remediation strategies used to engage at-risk students/classes including teaching meta-cognitive skills and accurate self-assessment. Following a series of interventions, I saw an improvement in performance of the at risk group on exam 2 with no significant difference between performance of the classes on the exam ($F(8,214)=1.026$, ns.) I also discussed some problems associated with teaching at risk groups including attrition.

Disclosures: S.C. Penley: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.14SU/DD10

Topic: J.02. Teaching of Neuroscience

Title: Neuroscience major development at a primarily undergraduate institution

Authors: *P. M. SIMONE, C. SABATIER;
Santa Clara Univ., Santa Clara, CA

Abstract: Undergraduate Neuroscience programs are growing across the United States but continue to be rare at primarily undergraduate institutions (PUI). In response to strong student interest, Santa Clara University launched its Neuroscience major in 2018. Enrollment has grown to over 100 majors and neuroscience is now one of the fastest growing, most popular majors identified by incoming first year students. We will discuss the development of the self-study that identified existing courses to support the program and the strategies taken to support the staffing needs, and the impact of designation as a program vs. department. We have defined an interdisciplinary, integrative curriculum that supports student exploration of neuroscience topics at multiple scales in deep and thoughtful ways that can be managed with the limited resources of a PUI. Student feedback has been instrumental to the development of the program and has led us to evolve critical pedagogical and curricular strategies to support students as they explore their diverse interests and potential career paths, including the launch of a major-wide adoption of e-Portfolios next year. We will share best practices in curriculum development, pedagogy and assessment that other PUIs may leverage to develop their own neuroscience program.

Disclosures: P.M. Simone: None. C. Sabatier: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.15SU/DD11

Topic: J.02. Teaching of Neuroscience

Support: Internal grant supporting civic and community engagement

Title: Educating about neurodiversity: Incorporating autistic perspectives into the classroom

Authors: *A. J. LAMPI, L. SHAH, V. K. JASWAL, T. M. EVANS;
Univ. of Virginia, Charlottesville, VA

Abstract: Here we describe a unique collaboration between a group of autistic young adults and college-students in an upper-level undergraduate seminar on autism and neurodiversity. Incorporating the voices, perspectives, and first-hand knowledge of stakeholders in the planning, design, analysis, and interpretation of research studies can improve the quality, rigor, and accuracy of scientific inquiry while crucially ensuring that scientists focus on asking questions important to the lives of those who are being studied (Cornwall & Jewkes, 1995). Traditional participatory research has focused on incorporating the experiences of racial, ethnic, or geographically bound groups (Nicolaidis et al., 2011). But there is a growing recognition that there is utility in extending this approach to the study of groups that experience particular disabilities (Pellicano & Stears, 2011). One group that has been at the fore of advocating for their inclusion in scientific research is the autism community (ASAN, n.d.).

Based on a desire to educate students on the necessity of both scientific rigor and the importance of stakeholder perspectives in autism science, a two-semester course was created. This course, titled “The Science and Lived Experience of Autism,” was designed to provide 20 undergraduate students the opportunity to develop empirical literacy skills while simultaneously engaging with a group of 8-10 college-aged autistic peers to discuss the importance and effects of autism science on the lives of these individuals. In this course, students and community partners critically analyzed topics ranging from the history, diagnosis, etiology and treatment of ASD, while simultaneously engaging in discourse regarding the effects of such research on both the neurotypical and autistic communities at large. Discourse occurred both online and at quarterly meetings of the two groups.

Three cohorts of undergraduate students (n = 60) have now gone through the seminar. Perspectives of the utility of the course were provided by both undergraduate students as well as the community partners. Students self-reported an increased ability to digest scientific literature, as well as an increased motivation to engage in participatory research/discourse in topics regarding autism in the future. Community partners reported on the benefits of inclusive scientific practices, as well as perceptions of the importance of educational opportunities where

they were asked for their input. Other implications include institutional-level perspectives of such courses' utility, as well as a discussion of the means through which this course was conceived and supported.

Disclosures: **A.J. Lampi:** None. **L. Shah:** None. **V.K. Jaswal:** None. **T.M. Evans:** None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.16SU/DD12

Topic: J.02. Teaching of Neuroscience

Support: UNO Center for Faculty Excellence

Title: An interdisciplinary approach to assessment: Evaluating student learning across the neuroscience major

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

Abstract: Like many Neuroscience programs, the undergraduate Neuroscience major at the University of Nebraska at Omaha (UNO) is an interdisciplinary program jointly supported by the Psychology and Biology departments. Students take a variety of required courses from both areas along with Neuroscience-specific courses. While the interdisciplinary approach has many advantages, it can be challenging to assess and track students' mastery of programmatic learning goals across multiple departments. This has been particularly problematic for our program, as course offerings in the Neuroscience program itself are generally restricted to introductory or upper-level courses (required intermediate courses consist of classes primarily offered in Biology and Psychology). Thus, an evaluation of student learning outcomes (SLOs) in classes from multiple departments is needed to capture a full picture of student achievement across the Neuroscience curriculum. The UNO Psychology department has been engaged in an evaluation of student learning for the past several years. Briefly, this assessment model uses a pseudo pre-test/post-test design whereby students are assessed on subjects relevant to departmental SLOs during the first week of the semester and results are compared across lower to upper-level courses. Hence the introductory courses serve as a "pre-test" for the mid-level courses, which can in turn be compared to upper-level courses, with the ultimate goal being a complete picture of student learning across the entire curriculum. We adapted and applied this model to courses in the Neuroscience program, while collaborating with the ongoing Psychology department assessment. Tests of SLO attainment were delivered to students in Introductory Neuroscience, Psychology Research Methods and the Advanced Neuroscience Laboratory course (the required capstone course for the major). These results were compared to create a comprehensive view of

SLOs across the program. Additionally, a standardized rubric for evaluating student writing assignments was piloted for the writing-intensive laboratory course. The results of our assessments will be used to inform program-level decisions, including future course design and offerings. They will also be shared with relevant stakeholders and used to promote the Neuroscience major to incoming UNO students. Furthermore, comparing this data over time will allow us to visualize the effect of any changes that are implemented. Future investigations will aim to include additional course work from the biology department, allowing us to holistically evaluate best practices at both the course and program levels.

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

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.17SU/DD13

Topic: J.02. Teaching of Neuroscience

Support: QEP internal grant from UCF

Title: Development and implementation of a new high-impact mixed-mode professionalism course for biomedical sciences majors at a large university: Biomedical sciences careers

Authors: ***A. L. HAWTHORNE;**
Burnett Sch. of Biomed. Sci., Univ. of Central Florida, Orlando, FL

Abstract: At the University of Central Florida (UCF), neuroscience is a track within our Biomedical Sciences major. UCF and other institutions have recently pushed to augment the number of high-impact experiences for undergraduates that prepare them for their futures. I developed the course Biomedical Sciences Careers (MCB 3933) with the support of an institutional Quality Enhancement Program grant (with Dr. Bill Self) and workshop. The course received a high-impact designation of Integrated Experience (IE) based on the metacognitive and networking assignments and final project. Biomedical Sciences careers is designed to prepare students for life after graduation and fulfill their career plan, so the class size was limited to 35 seniors. Students completed an individual development plan (IDP) at the beginning and end of the semester. In the first part of the course, students learned about post-baccalaureate educational or training opportunities available, such as masters, medical laboratory scientist, PhD and post-baccalaureate research programs. Some training opportunities were novel to students. In the next part of the course, students explored a variety of different jobs that are available, such as research, industry or medical lab. Expert speakers on the topics were effective in generating student interest. Assessments were assignment- and project-based and included online discussions, metacognitive reflections, IDP, personal statement, resume, elevator speech,

interview questions and ePortfolio. Students also networked with individuals within their IDP. For the final examination period, students presented their ePortfolios, which contained their resume, elevator speech video, personal statement excerpts, reflection excerpts, and three areas of interest. Each student tailored their ePortfolio toward the next step in their IDP. During class, 59% of students reported that knowledge from this class has changed their IDP. 89% indicated that the class was helpful, and 85% indicated that the class helped prepare them for their future. Anecdotally, one student was very successful with graduate school interviews, which they attributed in part to their ePortfolio. The goal is for students to apply their degree and to increase their success in and satisfaction with their careers.

Disclosures: A.L. Hawthorne: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.18SU/DD14

Topic: J.02. Teaching of Neuroscience

Support: Rutgers Open and Affordable Textbooks Grant

Title: Exploring the effectiveness of removing textbooks from a junior-level neuroscience I course at a primarily undergraduate institution (PUI) with a high percentage of first-generation low-income (FGLI) students in an effort to decrease course-associated costs

Authors: *N. T. FRIED;

Dept. of Biol., Rutgers Univ. Camden, Camden, NJ

Abstract: Rutgers University - Camden (RUC) is a Primarily Undergraduate Institution with very few graduate programs. Reflecting the RUC urban location, the student body is racially and ethnically diverse in traditionally underrepresented groups (16% African-American, 9% Asian, and 13% Latino). The Department of Biology has 350 undergraduates. 54% of these students are first-generation (neither parent has attended college). 72% of its students work off-campus jobs, suggesting a high rate of students from a low-income background. 91% of these students are commuters. However, a healthy number of them (15%) pursue graduate programs after attaining their Bachelor's in Biology. This paints a picture of a large student population from disadvantaged backgrounds that disproportionately strive to further their education. A common challenge these students face is the additional cost of purchasing textbooks. Thus, Rutgers initiated the "Open and Affordable Textbook Program" to support faculty in their efforts to remove textbooks from courses on campus. To this end, we removed the textbook traditionally used, "Neuroscience: Exploring the Brain, BEAR et al", in the 45-student Neuroscience I course. In its place, we integrated active-learning exercises and online materials into a flipped-model

classroom. These online materials ranged from open-access online texts to online neuron simulators to an aggregation of materials and primary literature to create a completely open-access library that successfully substitutes the materials offered in the BEAR textbook. Further, since this course was cross-listed with graduate students, we created a two-tier system to allow for more in-depth analysis required by graduate student studies. To assess the curriculum redevelopment of this course, students were surveyed about their experiences of not having a central textbook and whether their interests in pursuing further studies in neuroscience have changed. Future studies will examine whether this has decreased barriers for students from low-income backgrounds to take the course. Currently, it is estimated that removing textbooks from this course will save students \$9,000 each year.

Disclosures: N.T. Fried: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.19SU/DD15

Topic: J.02. Teaching of Neuroscience

Title: Student lectures improve performance even in unrelated writing assignments

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

Abstract: Past results in a cohort of occupational therapy students suggest that preparing and delivering a lecture about a chosen topic during lab period increased confidence and knowledge, and had measurable and reproducible positive effects on exam performance. Here, we test whether confidence in general increases quality of writing about other, unrelated neuroscience topics. The cohort (n=32) is pseudorandomly split into two sections of 16 students each. One lab group was assigned a project to prepare a mini lecture about membrane physiology, the other lab group was given prepared presentations to give on the same topic. Later in the semester, term papers were assigned, and no topics related directly to membrane physiology were allowed. The papers were blinded by assigning numbers to them and removing author information. By previously established measures of confidence, the papers from the students who had done lectures made better use of the primary literature (more primary sources, fewer quotes), and scored higher in general (mean score 21/25 vs 18/25 for the non-lecture group). We conclude that familiarity with the class in general has a favorable effect on writing about topics unrelated to the extra preparation itself.

Disclosures: A.K. Pack: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.20SU/DD16

Topic: J.02. Teaching of Neuroscience

Title: Identification with minority status influences student performance in undergraduate neuroscience courses

Authors: *A. C. NICHOLAS¹, Y. YADOLLAHI², N. S. DY²;

¹Univ. of California At Irvine, Irvine, CA; ²UCI, Irvine, CA

Abstract: The University of California, Irvine (UCI), is a first-generation and minority-serving institution, with a minority representation of 68.4%. Traditionally, underrepresented minorities, including Black, Latino, American-Indian, and Pacific Islander students, are less prepared for college. In the transition from high school to higher education, students from underserved and low socioeconomic backgrounds are often times faced with academic challenges. However, studies show that minority students studying at an institution with minority community representation do better compared with minority students studying at other schools. In this study, we investigate whether the degree to which a student feels like a minority influences overall academic performance compared with their actual minority status in undergraduate neuroscience classes. To test this, 536 students in two 2017 general education (GE) STEM neuroscience classes, Brain & Behavior and Pharmacology, were asked to what degree they felt like a minority in lecture, regardless of ethnicity. It was hypothesized that degree of minority identification may not reflect actual status because UCI has substantial minority representation. Our next question was to investigate whether a student's degree of identification had an impact on their overall academic performance. Results showed that minority students with the highest minority identification did significantly poorer in undergraduate neuroscience courses, compared to their minority classmates with low minority identification. No difference in performance was observed for non-minority students with high and low minority identification. There was also no significant difference found between genders. In conclusion, minority students with the highest minority self-identification are at a greater disadvantage in undergraduate neuroscience courses, possibly because of other risk factors, suggesting the need for greater academic support and intervention early on to foster the success of these students.

Disclosures: A.C. Nicholas: None. Y. Yadollahi: None. N.S. Dy: None.

Theme J Poster

024. Teaching, Learning, and Assessments

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 024.21SU/DD17

Topic: J.02. Teaching of Neuroscience

Support: Long Island University

Title: The effect of social reinforcement on student academic achievement

Authors: *J. C. NEILL, A. NUZZO, L. TEPPER;
Psychology, Long Island Univ., Brookville, NY

Abstract: Previous research demonstrated that public speaking in an undergraduate science class was associated with impaired memory, elevated heart rates and aversive emotional states. The present exploratory study tested the hypothesis that frequent social reinforcement for correctly reciting homework answers from memory in class would ameliorate stress reactions to public speaking and increase correct recitations of homework in class, the number of completed homework assignments, and improve accuracy in quizzes. Method: The campus Institutional Review Board approved this project before initiation. Subjects were 12 undergraduates in an upper level psychology course, (1 male and 12 females), ages 18-24 years. Design: The experiment had three phases. In all three phases, students received credit for each homework assignment equal to 1% of their course grade. In phase 1, baseline, students were required to turn in one written 10 question homework quiz. In phase 2, each student was additionally required to publicly recall and recite the answer to a randomly chosen short answer question from the homework, which now included 12 short answer questions per chapter. In phase 3, students were additionally required to recite the correct definition of a randomly selected vocabulary term from the homework. In experimental phases 2 and 3, the instructor and the assistant instructor began to present students with social reinforcement (praise) for correctly answering additional verbal questions in class. Results: after a habituation period in phase 2, all students were able to recite answers to homework questions, from memory, even when the amount of questions increased in phases 2 and 3, suggesting that verbal praise was reinforcing. However, there were statistically significant decreases in group means of objective quiz scores, as determined by one-way ANOVA ($F(2,10) = 6.65, p = .015$). Post hoc comparisons indicated a significant decline across phases 2 vs. 3, ($t(11)=2.561, p=.026$; as well as across phases 1 vs 3, ($t(11)=3.806, p=.003$). Student evaluations of the course were very positive compared to previous courses without the explicit social reinforcers for class participation. Conclusions: social reinforcement was effective in increasing verbal recitation of the material and positive subjective reports about the course experience; however, when public recall and recitation were required, scores on written quizzes consisting of multiple choice and short answer quizzes declined significantly. In agreement with our prior studies, we interpret this finding as consistent with a generalized disruptive effect of requiring public speaking in a modern college setting.

Disclosures: J.C. Neill: None. A. Nuzzo: None. L. Tepper: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.01SU/DD33

Topic: J.03. Public Awareness of Neuroscience

Support: NSF EEC-1028725

Title: Young scholars program-REACH: A neural engineering summer camp for high school students

Authors: *E. H. CHUDLER^{1,2}, J. M. WIGNALL²;

¹Bioengineering, ²Ctr. for Neurotechnology, Univ. of Washington, Seattle, WA

Abstract: The Center for Neurotechnology (CNT) at the University of Washington hosted a five-day summer program to introduce high school students to the fields of neuroscience, neural engineering and neuroethics. The program also provided basic preparation for college studies in STEM subjects and STEM careers. To apply to the program, students completed an online application that included one letter of recommendation, transcripts and answers to short essay questions about why they wanted to participate in the camp. To date, the YSP-REACH program has been offered during the summers of 2017 (1 session; 22 students) and 2018 (2 sessions; 25 students/session). In 2017, the program was offered free of charge to all students while in 2018, students paid a tuition of \$500. Full scholarships for students with financial need were provided. During the one week camp, participants toured research labs in various departments (e.g., Computer Science and Engineering, Electrical and Computer Engineering, and Rehabilitation Medicine) to learn about CNT research. Students also discussed neuroethics with personnel from the Department of Philosophy to learn about how ethical issues are related to neural technologies. Additional discussions with graduate students helped participants learn about career pathways in neuroscience. Students also performed a sheep brain dissection and recorded neural activity from a cockroach leg nerve. Trend data revealed significant student gains after the program in 1) knowledge of ethical and responsible conduct of research in neural engineering, core concepts in neural engineering, core concepts in neuroscience, and core concepts in neuroethics; 2) understanding how to build scientific knowledge in neural engineering, and the role of neuroethics in neural engineering; 3) knowledge of innovative practices in neural engineering; 4) confidence of their neural engineering skills and in their ability to succeed at a college or a university and 5) knowledge of careers in neural engineering, industry's role in neural engineering, and of careers in neuroethics. These data confirm that the engaging environment of this program stimulated students' interest in neuroscience and neural engineering research and provided students with information about potential career options, career pathways, and neuroethics.

Disclosures: E.H. Chudler: None. J.M. Wignall: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.02SU/DD34

Topic: J.03. Public Awareness of Neuroscience

Support: Acknowledgements: Rockefeller Neuroscience Institute, WVU Department of Neuroscience, SfN North Western Virginia Chapter, WVU Foundation staff including Ms. Kristen Shipp, and Monongalia County Schools administrative and teaching staff.

Title: Feeding our brains in West Virginia- Coupling neuroscience education with strategic philanthropy as a novel approach to engaging in brain awareness outreach and promoting social embeddedness in the local community

Authors: *T. J. PETRISKO¹, R. J. NELSON¹, B. A. WHITE¹, M. A. PRUNTY¹, E. L. STEWART¹, E. B. ENGLER-CHIURAZZI²;

¹Neurosci., West Virginia Univ. Sch. of Med., Morgantown, WV; ²Physiol. and Pharmacol., West Virginia Univ., Morgantown, WV

Abstract: Although brain awareness outreach programs have been active for decades, the graduate and undergraduate students at West Virginia University (WVU) sought to broaden the beneficial impact of our Brain Awareness campaign by pairing it with a philanthropic contribution to the Morgantown community. We first identified an addressable, neuroscience-related issue facing our state: childhood hunger. Malnutrition, resulting in nutritional deficits and inadequate energy supply have detrimental effects on brain development and scholastic performance. Food insecurity is a major issue for many West Virginians; 1 in 5 children live in homes defined as ‘food insecure’ and ~70% of students qualify for free/reduced school meals (WV Department of Education, 2018). Whereas state law guarantees children are fed in school, the average deficit in unpaid food bills in Monongalia County is ~\$40,000/school/yr (Engler-Chiurazzi, personal communication), meaning that districts allocate funds away from other resources to meet this requirement. Thus, food insecurity is a significant barrier to academic success among WV children and the high costs paid by local schools to address this issue represent an area for neuroscience-related philanthropic intervention. As such we developed a novel philanthropic component to our outreach program, “Feed Our Brains”. The philanthropic component of our outreach program was established by developing relationships with local community members committed to addressing childhood hunger. A WVU Foundation account was set up, to which online donations could be directed. We also initiated a T-shirt sales program and forged relationships with local restaurant owners to host benefit dinners in which a

percentage of the proceeds supported the “Feed Our Brains” program. Each fundraising effort was promoted in a variety of venues, including WVU internal e-news circulars, social media, online events calendars, and press releases—including an endorsement from WVU President Dr. Gordon Gee. Results: Since the launch of Feed Our Brains in the Fall of 2018, we have raised >\$2250. In May 2019, we made our first charitable donation of \$1000 to Monongalia County Schools that accompanied our presentation of our brain awareness curriculum including our newly developed brain nutrition activity, based on the TV show “Chopped,” to ~120 5th grade students. Conclusion: The WVU Neuroscience “Feed Our Brains” program is the first brain awareness outreach program to our knowledge to couple neuroscience education with a philanthropic outcome. We hope this presentation will serve as a primer for those interested in implementing similar efforts in their local communities.

Disclosures: T.J. Petrisko: None. R.J. Nelson: None. B.A. White: None. M.A. Prunty: None. E.L. Stewart: None. E.B. Engler-Chiurazzi: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.03SU/DD35

Topic: J.03. Public Awareness of Neuroscience

Support: NIH P60AA011605

Title: A bilingual interactive exhibition for brain awareness week & the University of North Carolina science expo: Opening doors for the Latinx community

Authors: *A. GOMEZ-A¹, J. BESHEER², D. L. ROBINSON²;

¹Bowles Ctr. for Alcohol Studies, ²Bowles Ctr. for Alcohol Studies and Department of Psychiatry, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC

Abstract: In a multicultural environment, it is necessary to overcome language boundaries to reach people from diverse backgrounds when transmitting relevant information. In the framework of the Brain Awareness Week and the UNC Science Expo, the UNC Bowles Center for Alcohol Studies organized outreach activities about the brain and included bilingual scientists, material and talks (Spanish, Portuguese) for those who do not use English as their first language. During the outreach events, visitors participated in two main activities: 1) the brain station, where participants explored the brain by observing and touching a postmortem human brain, a sheep brain and a model of a brain and skull; 2) brain-related activities, where participants experienced the “brain in action” using different instruments. Each station came with supporting material, specific instructions & scripts in English and Spanish. How did we make this possible?

- Recruiting volunteers: We used an outreach listserv to recruit volunteers. That message included an electronic sign-up link (<https://www.signupgenius.com/>) where people could choose the time/day to volunteer. We also used word-of-mouth to reach more bilingual volunteers.
- Material translation: Based on original material in English, a bilingual scientist translated the material to Spanish using the same figures, colors & contents to keep all the material in a standard fashion.
- Posters and badges: We posted brightly colored signs and used nametags stating “se habla Español” to advertise the volunteers’ bilingual capabilities. Also, because each brain activity has particular instructions, we ask a bilingual volunteer to adapt the activity contents to Spanish (or Portuguese) while talking.
- Asking about language preferences: We asked the visitors about their language preferences when they started the visit.
- Bilingual brochures: We distributed information about underage drinking facts and prevention from SAMSHA and the NIH in English and Spanish.
- Getting feedback: Finally, when a different language than English was used during the activities, we asked people about their experience getting the info in their language. It was particularly special to hear the parents of non-English speaking individuals say they felt more included.

Disclosures: A. Gomez-A: None. J. Besheer: None. D.L. Robinson: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.04SU/DD36

Topic: J.03. Public Awareness of Neuroscience

Support: Quinnipiac University
University of Connecticut

Title: The 32nd northeast undergraduate and graduate research organization for neuroscience (NEURON) conference held at Quinnipiac University’s Frank H. Netter M.D. School of Medicine in North Haven, CT

Authors: *R. A. ROTOLO¹, G. R. TANNER², N. L. TOTTENHAM³, V. FRANCONI⁴, C. A. FRYE⁷, A. C. BASU⁸, J. G. TRAPANI⁹, M. L. LINDEN¹⁰, T. H. AHERN⁵, A. J. BETZ⁶;
¹Psychological Sci., ²Physiol. & Neurobio., Univ. of Connecticut, Storrs, CT; ³Psychology, Columbia Univ., New York, NY; ⁴Med. Sci., ⁵Behavioral Neurosci. Program, Psychology, ⁶Psychology, Quinnipiac Univ., Hamden, CT; ⁷Psychology, Univ. Albany, Albany, NY; ⁸Psychology, Col. of the Holy Cross, Worcester, MA; ⁹Amherst Col., Amherst, MA; ¹⁰Neurosci., Brown Univ., Providence, RI

Abstract: The 32nd NEURON conference was held on February 24th, 2019, at Quinnipiac University's Center for Medicine, Nursing and Health Sciences. Quinnipiac University hosts the website for the NEURON conferences, which includes links to registration, abstract submission, archives of previous talks, resource links, and image galleries (www.quinnipiac.edu/neuron). The 2019 keynote speaker was Dr. Nim Tottenham, Professor of Psychology, Department of Psychology, Columbia University. Her talk was titled Emotional Brain Development and the Role of Early Experiences: Using neuroimaging and behavioral methods to examine development during childhood and adolescence. Dr. Tottenham's laboratory, the Developmental Affective Neuroscience Lab, focuses on the development of the neural circuitry underlying child and adolescent affect—the external manifestations of people's experience of emotion. Her lab is particularly focused on the neural wiring between the limbic system, which mediates emotion, and cortical regions, which are involved in higher-order cognitive processing. This research focus is framed in the context of early-childhood environments and how the ways in which children are raised affects their neural connections and thus later emotional development and behavioral outputs. At the conference, students and faculty participated in four workshops, including: the Careers in Science Panel; Communicating Science: Abstracts and Elevator Pitches; Detectives of Undiagnosed Disease: Utilizing the Undiagnosed Disease Network and Bioinformatic Tools; and Surgical Neurophysiology: An Exciting Frontier in Clinical Neuroscience. The Tieman and Frye awards were given to undergraduate and graduate students to honor the quality of their work and poster presentations. For the fourth year, NEURON partnered with Nu Rho Psi, the national neuroscience honor society, which offered a fourth student poster award. NEURON 2019 grew this past year, representing over 50 different institutions and 9 states. With continued local and regional support from faculty dedicated to student outreach and mentorship, and co-sponsorship from the University of Connecticut, NEURON has continued to expand beyond its original Boston locations to include greater representation from the northeast region and beyond.

Disclosures: **R.A. Rotolo:** None. **G.R. Tanner:** None. **N.L. Tottenham:** None. **V. Francone:** None. **C.A. Frye:** None. **A.C. Basu:** None. **J.G. Trapani:** None. **M.L. Linden:** None. **T.H. Ahern:** None. **A.J. Betz:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.05SU/DD37

Topic: J.03. Public Awareness of Neuroscience

Title: Engaging researchers and trainees in science advocacy

Authors: *A. H. TUTTLE;

Neurosci. Ctr., UNC Sch. of Med., Chapel Hill, NC

Abstract: Chronic pain impacts over 50 million Americans, and current pain management strategies are failing to deal with this crippling health issue. Lack of safe, effective analgesics have contributed to the current Opioid Epidemic, with over 47,000 US deaths from opioid overdoses reported in 2017. There is a clear need for continued support of basic pain research, in order to discover new, non-opioid analgesics and other effective non-pharmaceutical chronic pain management strategies. As part of the Society for Neuroscience's Early Career Policy Ambassador's Program, here I present my efforts over the past year advocating for continued pain research support. Specifically, this poster reflects my efforts to educate pain researchers and trainees in effective dialogue strategies with their local policymakers. Working with other professional societies, I identified pain researchers in key congressional districts and instructed them to contact their local policymakers. Willing participants were instructed on the best way to advocate for continued pain research funding, and encouraged to discuss the recent release of the HHS interagency Task Force Report outlining new best practices for evidence-based, patient-focused pain management strategies. Results of these outreach efforts are enumerated and discussed.

Disclosures: A.H. Tuttle: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.06SU/DD38

Topic: J.03. Public Awareness of Neuroscience

Title: Grey Matters Journal: Content diversity and engagement

Authors: *S. RAINA, J. BERGQUIST, C. FISHER, T. GUO, S. FISHER, R. RANGLES, F. MIRALLES, G. WANG, A. AHMED, K. SLOCUM, E. STEFANOU;
Univ. of Washington, Seattle, WA

Abstract: Grey Matters is the University of Washington's undergraduate neuroscience journal. Founded six years ago with the mission of open source scientific communication and outreach, Grey Matters has successfully produced 17 journal issues, available for free online. In a political climate rife with scientific ignorance and misinformation, we are committed building the accessibility of scientific research. Our journals display interdisciplinary content, as we involve students from a variety of backgrounds to collaborate as writers, editors, artists, and designers. We produce journals on a quarterly cycle, with each article reviewed by graduate students for scientific accuracy. We also host an annual outreach event called "An Evening With

Neuroscience” (EWN), which has drawn over 700 people each year. At this event, a panel of neuroscientists engage with the public, discussing their research and other neuroscience topics in an accessible manner. Because EWN leads to increased interest in our organization, we plan to widen the variety of our content to address this and allow for consistent community engagement. While we are primarily present on social media sites such as Facebook, Twitter, and Instagram, these platforms only target specific consumers. In order to expand our audience, we plan to employ other forms of communication such as videos and podcasts, tapping into markets we are just beginning to address. We are currently creating a new documentary series and developing a neuroscience podcast to broaden both our audience and opportunities for undergraduate involvement. The first documentary episode focuses on Brain-Computer Interfaces, educating the audience about the topic with visuals, explanations, and interviews with researchers in the field. We plan to release the full interviews as podcast episodes, serving as a resource for additional information on the topic and an introduction to leading scientists in their respective fields. We premiered a short segment at EWN, and we plan to release the full video after applying to the SfN video competition. We continue to pursue our mission of bringing scientific research to the public in an accessible way through content variation, maintaining research integrity, and combating issues of science miscommunication.

Disclosures: **S. Raina:** None. **J. Bergquist:** None. **C. Fisher:** None. **T. Guo:** None. **S. Fisher:** None. **R. Randles:** None. **F. Miralles:** None. **G. Wang:** None. **A. Ahmed:** None. **K. Slocum:** None. **E. Stefanou:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.07SU/DD39

Topic: J.03. Public Awareness of Neuroscience

Support: SfN Chapter Grant
WVU RNI
WVU Department of Neuroscience

Title: Reaching young minds in Morgantown, West Virginia

Authors: B. A. WHITE, T. J. PETRISKO, ***E. B. ENGLER-CHIURAZZI**, V. GRITSENKO;
West Virginia Univ., Morgantown, WV

Abstract: Inspiring the next generation to pursue the life of scientific discovery is a wonderful privilege. Often the simplest encounters between local children and scientists at various stages of their careers leave lasting impressions on young minds. Members of the Northern West Virginia Chapter of the Society for Neuroscience have teamed up with the faculty and students of the

Department of Neuroscience, the Division of Physical Therapy at West Virginia University and the Rockefeller Neuroscience Institute to create an outreach program that would make such encounters part of the educational experience of undergraduate/graduate student trainees and school children of all ages in Morgantown, West Virginia. We have conducted elementary school visits to teach kindergarteners, as well as 1st and 5th graders about the brain. We have also created event collaborations with Morgantown museums, libraries, and civic centers and conducted other public presentations about neuroscience-related issues of particular importance to the state of West Virginia. Since this program was initiated in 2014, these activities have impacted more than 1500 children, teachers, parents, and residents in the local community. For many children, neuroscience is not covered in the standard curriculum so this outreach program fills an important gap in the elementary education program. Furthermore, undergraduate and scientist volunteers who conducted the outreach activities served as positive career role models while at the same time enhancing their own understanding of the importance of communicating neuroscience to the public. As efforts related to our outreach program becomes centralized, in the future we hope to expand our impact to middle and high school students, and broaden the scope of our program to capture adult and aged populations.

Disclosures: **B.A. White:** None. **T.J. Petrisko:** None. **E.B. Engler-Chiurazzi:** None. **V. Gritsenko:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.08SU/DD40

Topic: J.03. Public Awareness of Neuroscience

Support: Instituto de Neuroetología, UV
Centro de Investigaciones Biomédicas, UV

Title: A very close stranger: Knowing the brain

Authors: C. J. JUÁREZ-PORTILLA¹, T. MOLINA-JIMÉNEZ³, M. ALVARADO⁴, T. CIBRIAN-LLANDERLAL², J. CUETO-ESCOBEDO⁵, G. GUILLÉN-RUIZ⁶, A. A. CORONA-MORALES¹, A. CORTÉS-SOL⁷, A. MARTÍNEZ-CHACÓN⁶, M. J. ROVIROSA⁸, F. GARCÍA-ORDUÑA⁶, E. MEZA⁹, B. BERNAL-MORALES⁶, J. E. MORALES-MÁVIL⁶, J. F. RODRÍGUEZ-LANDA⁶, D. HERNANDEZ-BALTAZAR¹⁰, F. A. GARCÍA-GARCÍA¹, F. NACHÓN⁵, E. TAMARIZ¹¹, D. I. DEL MORAL¹², G. R. ROLDAN¹³, ***R. C. ZEPEDA**¹;
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Xalapa, Mexico; ¹⁰Inst. de Neuroetologia, CONACYT-Instituto de Neuroetologia., Mexico, Mexico; ¹¹Univ. Veracruzana / Inst. De Ciencias De La Salud, Xalapa, Mexico; ¹²Ctr. De Investigaciones Biomédicas, Xalapa, Mexico; ¹³Natl. Autonomous Univ. of Mexico, Ciudad DE Mexico, Mexico

Abstract: One of the main topics in science refers the brain, including the nervous system. The discovery of the brain functions has allowed explaining since basic movements, cognition, emotions up to diseases such as dementia, Parkinson or addictions. Even when the brain controls all physiological functions we do not know the importance and relevance of this organ in the development of human activities. Thereby, it is important the dissemination of the relevance of the study and the care of the brain not only to academics, but also to different cohorts of the society. Thus, under and grad students and faculty members from the Biomedical Research Center, the Institute of Neuroethology, the Institute of Health Sciences, the Medical School, and the faculties of Nutrition, Biology and Chemistry of the Universidad Veracruzana participated in the Brain Awareness Week. The activities included: 5 Brain fairs at kinder gardens and elementary schools; 5 lectures to high school students at the “Carlos Fuentes” library, 15 lectures in high schools; 2 lectures at “Caftan Rojo” Art Gallery; 4 talks at “Zona de Niebla Brewery”; and a minisymposia at the University Anahuac’s Medical School. This year, 50 speakers contributed to the event with over 1K attendees. Our challenge is to gain more interest to the study of the brain, find new audiences as well as more people that help us to propagate the importance of neuroscience.

Disclosures: C.J. Juárez-Portilla: None. T. Molina-Jiménez: None. M. Alvarado: None. T. Cibrian-Llenderal: None. J. Cueto-Escobedo: None. G. Guillén-Ruiz: None. A.A. Corona-Morales: None. A. Cortés-Sol: None. A. Martínez-Chacón: None. M.J. Roviroso: None. F. García-Orduña: None. E. Meza: None. B. Bernal-Morales: None. J.E. Morales-Mávil: None. J.F. Rodríguez-Landa: None. D. Hernandez-Baltazar: None. F.A. García-García: None. F. Nachón: None. E. Tamariz: None. D.I. Del Moral: None. G.R. Roldan: None. R.C. Zepeda: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.09SU/DD41

Topic: J.03. Public Awareness of Neuroscience

Support: SFN Chapter Grant
FSU Program in Neuroscience
Congress of Graduate Students

Title: Your brain is a superhero: Increasing neuroscience knowledge through education outreach by FSU neuroscience

Authors: *A. C. STIMMELL, K. WALL, K. DAY, S. D. BENTHEM, J. BROWN, C. SIMMONS, J. ZHANG, C. EDWARDS, N. ABRAMS, L. SAILER, C. STRONG, R. AIKEN; 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 2018-19 academic year, graduate students visited high school classrooms and middle school classrooms, coordinated and held a lecture series for high school students called the Friday Neuroscience Lecture Series, and participated in Family Science Night, an event held for K-8 children. Furthermore, we hosted the 13th annual North Florida Brain Bee and 8th annual Brain Fair, and will participate in community educational events. In the fall, we participated in the Tallahassee Science Festival which attracts hundreds of community members of all ages. Our program displays hands-on activity booths that aim to increase neuroscience knowledge and interest. We visited 2 different high schools and used hands-on demonstrations to teach about the five sensory systems and neuroanatomy. 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 2019, the Brain Bee attracted competitors not only from Leon County, but also from different cities in Florida. With funding provided by our program and generous contributors, the Florida Brain Bee winner was sent to compete at the USA National Brain Bee Championship in Hershey, PA. In the spring, we held the Brain Fair. This free and family-friendly event aims to increase awareness of neuroscience in the community and is especially geared towards elementary school aged children. Graduate and undergraduate students across FSU departments had over 20 displays, interactive activities, and demonstrations of basic neuroscience. This year's Brain Fair theme was "Your Brain is a Superhero". After the Brain Fair, neuroscience graduate students participated in Family Science Night, a local community event hosted by the Tallahassee School of Arts and Sciences where scientists from multiple fields conduct interactive demonstrations for children K-8 as well as their families. Additionally, graduate students visited a middle school and educated grades 6-8 about the brain with interactive activities.

Disclosures: A.C. Stimmell: None. K. Wall: None. K. Day: None. S.D. Benthem: None. J. Brown: None. C. Simmons: None. J. Zhang: None. C. Edwards: None. N. Abrams: None. L. Sailer: None. C. Strong: None. R. Aiken: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.10SU/DD42

Topic: J.03. Public Awareness of Neuroscience

Title: NW Noggin: Corrections, bias and brains

Authors: *W. S. GRIESAR^{1,3,4}, J. J. LEAKE^{4,2};

¹Psychology/Neuroscience, ²Univ. Studies, Portland State Univ., Portland, OR; ³Behavioral Neurosci., Oregon Hlth. & Sci. Univ., Portland, OR; ⁴Art & Neurosci., NW Noggin, Portland, OR

Abstract: “All is in motion, is growing, is you” - Joy Harjo

Science needs investment and diverse perspectives, and integrating arts in STEM (STEAM) encourages people to get involved. The public pays for research, yet many lack access to useful findings.

Nonprofit NW Noggin (nwnoggin.org) organizes undergraduates and graduates to collaborate, build community networks and inspire people about neuroscience and the arts. Volunteers benefit from work across disciplines and institutions, serve as “near peer” role models, gain skill explaining research, and think creatively about careers. We’ve met over 30,000 people since 2012!

Teenagers undergo dramatic, consequential change in brain anatomy and function, responding to environments and making mistakes. How others react impacts development, benefiting or undermining the trajectory of young lives.

The social rules we learn in adolescence are complex. They depend on who you are, including race, sex, gender identity, sexual orientation, class, neighborhood, national origin and a host of other factors. Research also highlights the significant ethnic and income differences in youth and lifetime experiences of trauma.

Yet in 1994, Oregon voters passed Ballot Measure 11, which established mandatory minimum sentences for “serious crimes against persons” and required defendants aged 15 and older to be tried as adults. Oregon now has one of the highest youth incarceration rates in the country.

Native American, Hispanic and Black Oregonians are incarcerated at disproportionately higher rates relative to white people.

Teenagers are not adults. This year we worked with the Hope Partnership and the Oregon Youth Authority to bring NW Noggin volunteers to the MacLaren Youth Correctional Facility, where over 200 boys and young men (ages 12 - 25) are confined. We enjoyed powerful discussions about the brain basis of trauma, anxiety, and emotional regulation, bias in judicial and law enforcement systems, pathways in psychology for counseling and research, and what role neuroscientists play, or might play, in judicial and legislative reform. MacLaren youth are studying the law and neuroscience in order to bolster a case for changes to Measure 11.

Building excitement and awareness of discoveries, educational options and careers through arts-integrated outreach across institutional, state, federal and generational lines trains new scientists to collaborate, brings useful, actionable knowledge to underserved communities, and increases awareness and support for investment in brain research and the arts.

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

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.11SU/DP15/DD43

ControlExtraData.DynamicPosterDisplay:

Dynamic Poster

Topic: J.03. Public Awareness of Neuroscience

Support: P60AA011605
UNC Bowles Center for Alcohol Studies

Title: Memory games - An interactive exhibit for Brain Awareness Week

Authors: *D. L. ROBINSON, A. GOMÉZ-A, M. M. MACHADO, M. H. MCFARLAND, J. BESHEER;
Bowles Ctr. for Alcohol Studies, Univ. of North Carolina at Chapel Hill, Chapel Hill, NC

Abstract: For Brain Awareness Week 2019, scientists from the UNC Bowles Center for Alcohol Studies organized an interactive exhibit “Memory Games” as a platform for the community to learn about attention and memory. 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 first explored the human brain by observing and touching a postmortem human brain, a sheep brain and a brain/skull model. Scientists talked with visitors about the different parts of the brain and their function, especially those functions used in the “Memory Games” activity - vision, perception, attention, memory. Scientists answered and asked questions to promote conversation. Next, visitors entered a gated lab area for the “Memory Games” activity, which began with a quick game of Spot It! (Asmodee). In this card game, each card has a number of pictures, and any two cards will have one item (but only one) in common, and whoever identifies the common item first wins the round. This game introduced the concepts of attention and short term memory. Then we explicitly tested short-term memory by showing visitors 10-20 small toys and other items on a tray, giving them time to study them, then covering the items and assessing how many they remembered. This activity was adjusted based on the age of the visitor, and supported conversations on memory, mnemonics, and attention. Scientist volunteers were given detailed instructions on the activity and trained before their shift. The exhibit was staffed by 35 scientists and students. Approximately 600 children and 260 adults participated in the “Memory Games” activity over the 5 days (4-6 hr/day), with many more engaging with the brain exhibit. The activity was also adapted to an outdoor science expo. As these events were supported by an NIH grant to the UNC Bowles Center for Alcohol Studies, brochures on underage drinking facts and prevention from SAMSHA and the National Institute on Alcohol Abuse and Alcoholism were distributed. Conversations on science outreach and brain health (wearing a helmet, eating healthy food, protecting our brains from drugs and alcohol) were encouraged.

Funded by the Information Dissemination Core of the UNC Alcohol Research Center (National Institute of Alcohol Abuse and Alcoholism, P60AA011605, “Molecular and Cellular Pathogenesis in Alcoholism”).

Disclosures: **D.L. Robinson:** None. **A. Gómez-A:** None. **J. Besheer:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.12SU/DD44

Topic: J.03. Public Awareness of Neuroscience

Support: Donation from The International Brain Research Organization
Donation from The Federation of European Neuroscience Societies
Donation from The Dana Foundation
Donation from The Society for Neuroscience
Donation from the American Psychological Association

Title: The 2019 world brain bee championship

Authors: ***N. R. MYSLINSKI;**

Neural and Pain Sci., Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: Future neuroscientists from around the world met in Daegu, South Korea, to compete in the 21th Anniversary Championship of the International Brain Bee (IBB). The IBB is the preeminent neuroscience competition for teenage students. The event was hosted by the **International Brain Research Organization** in September, 2019. Worldwide there are about 175 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 including a neuroanatomy exam using human brains, and a patient diagnosis component. The regions competing were not known at press time, but the regions that sent their champions to the IBB Championship last year (2018) (and their coordinators) **were Australia (Ramesh Rajan), Brazil (Alfred Sholl-Franco), Canada (Judy Shedden), China (Jiangjie Yu), Egypt (Nardene Saad), France (Helen Sahin Connelly), Germany (Ina Simeonova), Grenada (Gail Blackette), Hong Kong (Stephanie Auyeung), India (RMV Ravindranadh R V), Iran (Abbas Hadhparast), Israel (Illana Gozes), Italy (P. Paolo Battaglini), Japan (Tetsu Okumura), Kenya (Nchafatso Gikenyi Obonyo), Korea South (Seong-Whan Lee), Macau (Thomas Lao), Malaysia (Jafri Malin Abdullah), New Zealand (Maurice Curtis), Poland (Elzbieta Malgorzata Pyza), Romania (Cristian Gurzu), Ukraine (Andril Cherninskyi), United Arab Emirates (Sathy Parvathy), United Kingdom (Martyna Petrulyté), and United**

States (Norbert Myslinski). The IBB has been recently reorganized as a Non-Profit Foundation with a Board of Directors from the **American Psychological Association, Society for Neuroscience, Dana Alliance for Brain Initiatives, International Brain Research Organization, and Federation of European Neurosciences Societies.** According to the founder, Dr. Norbert Myslinski, the IBB's purpose is to motivate young men and women to learn about the human brain, and to apply that knowledge to their daily lives; and to inspire them to enter careers in the basic and clinical brain sciences to help treat and find cures for brain disorders. An estimated 20,000 students compete annually. More than 100 newspapers, radio, television stations and web sites cover the IBB. 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 motto is: Building Better Brains to Fight Brain Disorders.

Disclosures: N.R. Myslinski: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.13SU/DD45

Topic: J.03. Public Awareness of Neuroscience

Title: The 10th Annual Kingston Brain Bee: Best practices from a small Canadian city

Authors: *C. A. LOWRY, K. A. TRESIDDER;
Ctr. for Neurosci. Studies, Queen's Univ., Kingston, ON, Canada

Abstract: The Brain Bee is a neuroscience competition for high school students that is celebrated in more than 50 countries around the world. The competition tests students' knowledge of neuroscience and neuroanatomy, as well as the ability to 'diagnose' neurological diseases. The Brain Bee is a innovate way to stimulate early interest in neuroscience among adolescents, in addition to providing an enrichment opportunity to learn about the brain and the value of scientific research. The competition is three-tiered, with students participating at local, national, and international levels. There are 17 local Brain Bees across Canada, with the Kingston Brain Bee being one of Canada's smallest competitions. Presented by the Centre for Neuroscience Studies (CNS) at Queen's University, the competition has been organized by a team of graduate students as part of the award-winning Neuroscience Outreach Program for a decade. In 2016, Queen's University was named the Best Local SfN Chapter in the "promoting neuroscience to the public" category at the Canadian Association for Neuroscience Annual Meeting. The Kingston competition, held annually each April, has faced challenges with both student enrollment and retention. Over the past two years, the entire program has been revamped and numerous strategies implemented with the aim of increasing student engagement. One such

strategy was the addition of a ‘Brain Bee Ambassador’ program, whereby previous competitors volunteer to promote the Kingston Brain Bee within their schools, as well as provide peer-to-peer mentorship for prospective competitors. Brain Bee Ambassadors earn volunteer hours towards their high school diploma as a result of their involvement in this program, and are not precluded from subsequently participating again in the Brain Bee should they choose. Other strategies include a ‘Question of the Month’ contest, as well as two annual ‘Q&A sessions’ held on-site at the university as a forum for competition preparation. Together, these changes have led to an overall increase in participants since 2017, with a 133% increase in student competitors this year compared to 2018. Additionally, we have witnessed a three-fold increase in the number of repeat competitors in 2019 compared to 2018. Here, we present some of our best practices and tips for recruitment, retention, and competition structure that can be implemented on any scale to improve student engagement in this unique program, as well as raise the profile of Brain Bee within the community.

Disclosures: C.A. Lowry: None. K.A. Tresidder: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.14SU/DD46

Topic: J.03. Public Awareness of Neuroscience

Support: Penn State Neuroscience Institute

Title: The 2019 United States Brain Bee Championship

Authors: *K. VENKITESWARAN¹, S. RAVI¹, K. LE¹, E. BLANKE¹, M. SUBRAMANIAN¹, C. WHITE¹, B. CAMERON¹, A. KONDRMASHIN¹, Y. KIM¹, A. BARBER¹, T. SUBRAMANIAN¹, N. R. MYSLINSKI²;

¹Penn State Col. of Med., Hershey, PA; ²Neural and Pain Sciences, 8th floor, Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: After three days of intense competition, the 2019 USA Regional Brain Bee Champion is **John Yang**, representing the Newark, New Jersey, Brain Bee Chapter. The Brain Bee is a neuroscience competition for teenage students. The event was hosted by the **Penn State College of Medicine** and coordinated by **Kala Venkiteswaran** and **Thyagarajan Subramanian**. A record fifty-six Chapter winners from 34 states competed in the USA Championship in April, 2019. John Yang won a scholarship, and a summer internship at a neuroscience lab. 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, and many others. The USA Championship competition involves a neuroanatomy laboratory exam with human brains, patient

diagnosis, and a final question-and-answer component. To advance to the USA Regional Championship, John won the Newark, NJ, Chapter competition coordinated by Steve Levison of New Jersey Medical School. Second place went to **Julia Colin** representing **Piscataway, NJ**. Third place went to **Clair Wang** of **Los Angeles, CA**. **Henry Shen** from **Atlanta, GA** came in fourth; **Aashi Anne** from **Rootstown, OH** came in fifth; **Kimberly Shen** from **Minneapolis, MN** came in sixth; **Ifenna Amaefuna** from **Philadelphia, PA** came in seventh; **Daye Kwon** from **Little Rock, AR** came in eighth; **Petra Dujmic** from **Worcester, MA**, came in ninth; and **Bhavya Boddu** from **Washington, DC** came in tenth. John Yang will represent the USA at the twenty-first **World Brain Bee (WBB) Championship in Daegu, South Korea** where he will compete against the regional champions from approximately 27 countries such as **Australia, Brazil, Canada, China, Egypt, France, Germany, Grenada, India, Iran, Israel, Italy, Japan, Kenya, Korea, Malaysia, New Zealand, Nigeria, Poland, Romania, Singapore, South Africa, Ukraine, and others**. The 2019 WBB Championship is hosted by the **International Brain Research Organization**. The USA Brain Bee is an Official Region of the International Brain Bee (IBB). **Dr. Norbert Myslinski, Department of Neural and Pain Sciences, University of Maryland, Baltimore, founded the IBB, directs the USA Brain Bee, and is Chairman of the Board of Directors that is comprised of members from the Society for Neuroscience, the American Psychological Association, the Dana Alliance for Brain Initiatives, The International Brain Research Organization, and the Federation of European Neurosciences Societies**. Dr. Myslinski says, “The Brain Bee’s purpose is to motivate young students to learn about the human brain and inspire them to seek careers in the basic and clinical neurosciences to help treat and find cures for brain disorders.”

Disclosures: **K. Venkiteswaran:** None. **S. Ravi:** None. **K. Le:** None. **E. Blanke:** None. **M. Subramanian:** None. **C. White:** None. **B. Cameron:** None. **A. Kondromashin:** None. **Y. Kim:** None. **A. Barber:** None. **T. Subramanian:** None. **N.R. Myslinski:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.15SU/DD47

Topic: J.03. Public Awareness of Neuroscience

Title: Columbia University neuroscience outreach: Publicly available curriculum to share science with our local community

Authors: ***L. J. SIBENER**, R. VAADIA, M. STACKMANN, M. TSITSIKLIS, L. LONG, A. KAUFMAN, G. M. PIERCE, L. A. COIE, K. M. MARTYNIUK, J. L. SCRIBNER, S. BITTNER, A. VILLEGAS, Y.-N. JEON, G. H. PETTY, A. A. MORGAN, A. BURGOS; Columbia Univ., New York, NY

Abstract: Columbia University Neuroscience Outreach (CUNO), a graduate student-run program, seeks to foster a lifelong interest in the brain and in science among New York City school students and the general public. Since 2005, CUNO has benefited our neighboring community by providing both long-term and stand-alone scientific workshops for school-aged students. CUNO partners with local schools and sends our volunteers to teach single-visit or semester-long neuroscience lessons. Beyond the classroom, we have developed unique programming tailored to engage community members of all ages such as Late Night Science, a monthly-seminar series led by graduate students that welcomes non-scientists into the labs at the Columbia University Medical Campus and the Zuckerman Mind Brain and Behavior Institute (ZI). Here, CUNO student hosts present a community-friendly overview of their research and then guide the visitors through their lab, highlighting the experimental process. CUNO also co-hosts Saturday Science, a monthly community event where we lead hands-on activities and demonstrations to explore the workings of the brain in conjunction with ZI's Educational Outreach Department and BioBus. These programs are made possible by the self-made curriculum CUNO graduate students have developed over the past 14 years. We have now created a database, the Brain Bank, to make these lesson plans available to the public through the CUNO website (columbiabrain.org). The Brain Bank has more than 20 detailed neuroscience lesson plans in both English and Spanish, as well as detailed instructor guides for single classroom visits and hands-on activities. Our curriculum is designed so teachers and outreach groups can download these resources and implement these courses with little to no extra materials and minimal preparation and training. This public database furthers our mission to promote scientific curiosity by expanding accessible science education resources beyond our local community. We hope our outreach program can serve as a model for bringing science to a public audience.

Disclosures: **L.J. Sibener:** None. **R. Vaadia:** None. **M. Stackmann:** None. **M. Tsitsiklis:** None. **L. Long:** None. **A. Kaufman:** None. **G.M. Pierce:** None. **L.A. Coie:** None. **K.M. Martyniuk:** None. **J.L. Scribner:** None. **S. Bittner:** None. **A. Villegas:** None. **Y. Jeon:** None. **G.H. Petty:** None. **A.A. Morgan:** None. **A. Burgos:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.16SU/DD48

Topic: J.03. Public Awareness of Neuroscience

Support: Concordia University Faculty of Fine Arts

Title: The trans-disciplinary convergence course curriculum: Neuroscience, arts, and society

Authors: *C. A. ZAELZER^{1,2}, B. FORGET^{1,2};

¹Convergence Initiative, Longueuil, QC, Canada; ²Design and Computat. Arts Fac. of Fine Arts, Concordia Univ., Montreal, QC, Canada

Abstract: “Convergence: Arts, Neuroscience, and Society” is a two-semester interdisciplinary, interuniversity course, where 12 neuroscience students (MSc, PhD, Trainees) from the McGill University Integrated Program in Neuroscience (IPN) and 14 fine art students (BA) from Faculty of Fine Arts (FoFA) from Concordia University work together to create collaborative sci-art projects. The curriculum was developed as part of the Convergence Initiative, a non-profit organization that aims to foster the general public’s understanding of neuroscience by fusing art and science. The curriculum offers a challenging and stimulating combination of lectures, debates, site visits, and workshops. Through independent study, collaborative studio work, and group discussions, the students discover territories outside their scientific and artistic comfort zones. The developed pedagogy transcends disciplinary boundaries by focusing on research practice, public outreach, and questioning disciplinary stereotypes. The 2018/2019 iteration of the Convergence course culminated in an art exhibition that featured an integrated science symposium. The students produced 12 collaborative artworks which artistically interpreted contemporary neuroscience research. Concurrent with the art exhibition, a neuroscience symposium allowed the students to present their science communication media projects to the general public with non-traditional methods learned during the length of the course. In this poster, we share the methods and experiences from this year’s course.



Disclosures: C.A. Zaelzer: None. B. Forget: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.17SU/DD49

Topic: J.03. Public Awareness of Neuroscience

Support: UConn/UTC-IASE Startup Grant

Title: Showcasing controls systems engineering in neurological disorders

Authors: *A. DUTTA;

Electrical and Computer Engineering, Biomed. Engin., Univ. of Connecticut, Storrs, CT

Abstract: Twenty million Americans experience some form of neuropathy and 16% of U.S. households contain an individual with brain impairment. Preliminary treatment focuses on pharmacological and psychiatric methods during early stage but fails to keep up as the disease progresses. That's when engineering techniques ranging from computational modeling of the neural pathways to controlling the disorder by electrical stimulation can do a world of good. Thus education and creating general social awareness about the role of engineered systems in controlling neurological disorders has become critical. A three tier approach is proposed: I. A multi-disciplinary educational program on neural-engineering at university level, II. Hands-on outreach activities on neural-engineering at state level, III. Dissemination of popular neural engineering results through mainstream scientific media at global level.

I. Analysis leading to treatment of neurological diseases is by far the most complicated problem as it needs a knowledge of various disciplines ranging from neurobiology, neuro engineering to pharmacy and molecular biology. With the recognition that students seldom have a command on all, I have a neuro engineering tailored curriculum with an aim to computationally model and control the brain. The translation is through my multi-disciplinary bio-engineering laboratory consisting of electrical circuit fabrication and robotics to neural cell-culture and brain surgery. II. I have created a demonstrator that can be used by kids and adults alike to quickly assemble regions of brain involved in a disorder and connect them together using excitatory, inhibitory or modulatory dynamics. One can then perform neural degeneration or depletion of neuro-modulator to simulate the corresponding disease and come up with subsequent cures current injections in any of the involved regions. This is to be demonstrated in the Rhode Island Brain Week to increase public awareness of benefit of brain research.

III. We have created a Cyborg i.e. a biological robot where we developed and surgically connected a micro-circuit to an insect's brain through micro-electrodes, which can then be steered wirelessly. This transformative neuro-muscular control research has been widely published by the mainstream and scientific media generating widespread curiosity amongst the public at large and made them question if such engineered control systems could then be used to control the human brain?

Disclosures: A. Dutta: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.18SU/DD50

Topic: J.03. Public Awareness of Neuroscience

Support: NSF NCS/DRL 1631563
Marie Skłodowska-Curie Individual Fellowship Grant #750026

Title: My so-called lab: Boosting the visibility of women in science

Authors: K. L. BRYANT¹, J. PARGETER², H. DINGWALL³, M. YOUNG³, E. JAGODA³, A. C. KRUGER⁴, L. A. LEMING⁵, *E. E. HECHT³;

¹Donders Inst. for Brain, Cognition & Behaviour, Radboud Univ., Nijmegen, Netherlands;

²Anthrop., Emory Univ., Atlanta, GA; ³Human Evolutionary Biol., Harvard Univ., Cambridge, MA; ⁴Col. of Educ. & Human Develop., Georgia State Univ., Atlanta, GA; ⁵WebMD, Atlanta, GA

Abstract: Women and members of minority groups are systemically underrepresented in STEM fields. Progress is hampered by implicit environmental and social barriers, including stereotypes, gender bias, and the climate of STEM departments in colleges and universities. Despite this, research shows that a growth mindset (that is, believing intelligence is a malleable rather than a fixed attribute) is associated with success. A key component of the growth mindset is the viewpoint that STEM skill is built through experience and learning rather than being an innate characteristic of some people but not others. Here, we describe the development and implementation of *My So-Called Lab*, a digital media outreach project with the goal of promoting a growth mindset in order to counteract implicit and workplace biases in STEM fields. The project also aims to encourage and promote women scientists by making stories about their research more accessible to broader audiences. Although much attention is given to the recruitment of underrepresented groups in science, less attention has been paid to retention, a key issue in the “leaky pipeline.” Therefore, *My So-Called Lab* does not focus on the question of whether or not women and girls should or are capable of doing science. Rather, the project highlights the ongoing work and real-world experiences of women scientists and provides a platform for discussion and engagement. *My So-Called Lab* embraces the diversity and multiplicity of what constitutes research (traditional wet labs, field sites, and digital research spaces) and strives to curate stories from all of these spaces. The project has three main components: (1) an ongoing showcase of lab “selfies”, in which women scientists can submit photos and biographies of themselves doing their research; (2) a podcast series in which women scientists are interviewed to discuss their research, rewarding moments, challenges, and other insights about life in the lab, and (3) several linked social media platforms allowing users to

share and discuss this content. As part of our poster presentation, we will introduce the website and social media accounts to the neuroscience community, showcase a selection of interviews and lab selfies, and invite further contribution and participation.

Disclosures: **K.L. Bryant:** None. **J. Pargeter:** None. **H. Dingwall:** None. **M. Young:** None. **E. Jagoda:** None. **A.C. Kruger:** None. **L.A. Leming:** None. **E.E. Hecht:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.19SU/DD51

Topic: J.03. Public Awareness of Neuroscience

Support: National Science Foundation NeuroNex 1707352

Title: Building a bioluminescent and optogenetic learning community through immersive outreach experiences

Authors: **K. R. LITERMAN**¹, **J. J. ALLEN**¹, **D. LIPSCOMBE**^{1,2}, **U. HOCHGESCHWENDER**³, **N. C. SHANER**⁴, ***C. I. MOORE**^{1,2};

¹Neurosci., ²Robert J. and Nancy D. Carney Inst. for Brain Sci., Brown Univ., Providence, RI;

³Neurosci., Central Michigan Univ., Mt Pleasant, MI; ⁴Univ. of California, San Diego, CA

Abstract: The Bioluminescence Hub, a National Science Foundation NeuroNex Technology Hub, is dedicated both to the development of novel bioluminescent and optogenetic tools and to the broad dissemination of those tools and the scientific concepts underlying their development. We are committed to education at all levels: the general public, grade and high school, undergraduate, and postgraduate. At the public and K-12 levels, we introduce participants to living bioluminescent organisms and leverage the captivating nature of these organisms to illustrate how these natural lights can illuminate the path toward discovery. In addition to mentoring undergraduate interns at each of our three partner universities, our Hub hosts an annual Undergraduate Practicum at the Marine Biological Laboratory in Woods Hole, MA, an immersive experience where students from around the country meet for lectures, hands-on laboratory experiments and demonstrations, and hone team science skills through a technology venture proposal competition. Our postgraduate training is twofold: we maximize the accessibility and utility of our tools by hosting training Workshops and sending research Emissaries to interested laboratories. In addition to providing recipient laboratories new ways to pursue their research questions, these activities provide our postgraduate team members with the opportunity to serve as educators. By tailoring unique and immersive outreach and education experiences for audiences across learning levels, the Bioluminescence Hub is building a large

and diverse community that understands the innovation potential of bioluminescence- and optogenetics-based research.

Disclosures: **K.R. Literman:** None. **J.J. Allen:** None. **D. Lipscombe:** None. **U. Hochgeschwender:** None. **N.C. Shaner:** None. **C.I. Moore:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.20SU/DP15/DD52

ControlExtraData.DynamicPosterDisplay:

Dynamic Poster

Topic: J.03. Public Awareness of Neuroscience

Support: STEM award from NASA DC Space Grant Consortium

Title: The OpenBehavior project

Authors: ***M. LAUBACH**¹, L. M. AMARANTE¹, M. W. PRESTON, JR², S. R. WHITE¹, A. V. KRAVITZ³;

¹Ctr. for Behavioral Neurosci., American Univ., Washington, DC; ²Neurophysiological Pharmacol. Section, NIH NINDS, Bethesda, MD; ³Psychiatry, Washington Univ., St Louis, MO

Abstract: Open-source tool use has been increasing in recent years, following a revolution in low-cost electronics, 3D printing methods, and circuit board production. The OpenBehavior Project provides the behavioral neuroscience research community with information about new DIY lab projects, devices, and programs. The website has featured a wide variety of tools, including those for delivering reward, analyzing behavior via video, and interfacing behavioral equipment with emerging technologies for electrophysiology, optical imaging, and fiber photometry. Prior to the launch of our site, access to design files, build instructions, and software typically relied on word of mouth, isolated blogs, and social media posts by individual researchers. Through our project, researchers from around the world have become aware of new open-source tools allowing them to reproduce and implement them into their own research. The OpenBehavior website is 100% non-commercial and all content has been generated by volunteer efforts. To date, the site has featured more than 100 projects, receives >2.5K views per month, and has generated a substantial following on Twitter. We have also developed a partnership with Hackaday.io for sharing designs for neuroscience-related hardware. While our efforts have led to wider dissemination of information about open-source projects for neuroscience research, we believe that the impact of these projects can be even greater. There is a clear need for workshops and training courses on commonly used methods for developing open-source hardware and software. We also need to develop community-supported methods for categorizing tools and

tracking their use (e.g. RRIDs). Finally, while options already exist for rapidly sharing designs (e.g. GitHub, Hackaday.io) and efforts are underway to develop new options for publishing open-source tools in major society journals, community buy-in is needed to make these efforts successful. We welcome feedback and discussion on these issues.

The OpenBehavior Project: <https://edspace.american.edu/openbehavior/>

Disclosures: **M. Laubach:** None. **L.M. Amarante:** None. **M.W. Preston:** None. **S.R. White:** None. **A.V. Kravitz:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.21SU/DD53

Topic: J.03. Public Awareness of Neuroscience

Title: Most recent iteration of an open source extruder for bioprinting

Authors: ***D. FOSTER**¹, J. KOO¹, R. LEE¹, B. TENG², T. MANZO¹, S. FISHMAN¹, D. WAHLQUIST³, T. VEGVARI³;

¹TheLab Inc, Los Angeles, CA; ²Biol., California State University, Northridge, Northridge, CA;

³PVNet, Rolling Hills Estates, CA

Abstract: Bioprinting is a process that can create 3-dimensional constructs composed of living cells. The technology has been used to make replicable microenvironments for culturing nervous tissue *in vitro*. The ease with which designs can be both replicated and altered using a computer-aided design (CAD) program facilitates investigations on the effects of cell spatial orientation on cell metabolism. Bioprinters are inherently adept at creating thin layers of cell-infused hydrogels (bioinks). Others have printed representations of the layered human cortex by altering the type of nerve cells infused in successive layers of bioink. We are particularly interested in cell self-assembly and have worked to improve print resolution. An existing extruder has been refined to print a previously described hydrogel in the shapes of pyramids, icosahedrons, cubes, simple vasculature, and scaled down models of organs available from the National Institutes of Health (NIH) 3D Print Exchange. The extruder design has been open sourced and is compatible with delta and Cartesian 3D printers. Tests are being conducted in parallel to optimize a bioink. Progress on the extruder has taken place at multiple community labs, and input has come from people both with and without backgrounds in neurobiology.

Disclosures: **D. Foster:** None. **J. Koo:** None. **R. Lee:** None. **B. Teng:** None. **T. Manzo:** None. **S. Fishman:** None. **D. Wahlquist:** None. **T. Vegvari:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.22SU/DD54

Topic: J.03. Public Awareness of Neuroscience

Title: From cells to circuits toward cures: Updating NIH contributions to the BRAIN Initiative

Authors: A. B. ADAMS, K. B. DUPRE, G. FARBER, J. A. GORDON, N. S. HSU, W. J. KOROSHETZ, K. M. RAMOS, E. M. TALLEY, S. R. WEISS, *S. L. WHITE;
NIH, Bethesda, MD

Abstract: The **Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative**[®] aims to revolutionize our understanding of the human brain by accelerating the development and application of innovative neurotechnologies.

The NIH BRAIN Initiative largely focuses on neural circuits and networks, and by all accounts, its first five years have been enormously successful. Over 500 awards have been made to hundreds of investigators, totaling nearly \$1B in investment and resulting in over 600 publications. As the Initiative approached its halfway point, **a new Advisory Committee to the NIH Director (ACD) BRAIN Initiative Working Group (WG) 2.0** was convened to assess progress, and to identify key research directions and opportunities to apply new and emerging tools to revolutionize our understanding of how the brain works. Through public workshops, town halls, and opportunities for public comment, the BRAIN WG 2.0 engaged with the broad research community to ensure that they are responsive to multi-stakeholder input. The report, *From Cells to Circuits, Toward Cures*, found the execution of BRAIN to be faithful to the initial strategic vision, resulting in many accomplishments (e.g., the BRAIN Initiative Cell-Census Network). It also identifies new and transformative research opportunities that were not apparent five years ago.

Among their findings, the BRAIN WG 2.0 suggested a continued focus on technology development, while also increasing the emphasis on experimental science. Organizationally, the WG considered the need to balance individual-investigator research and team science, and the important integration of neuroethics within the Initiative. Areas for greater emphasis include: a diversity of model systems as well as human neuroscience; improved behavioral paradigms; and integration of approaches across scales, including the use of theory and modeling.

Transformative projects were also suggested - for example, circuit-level cures for human neuropsychiatric or neurological disease, an atlas of human brain cell types, and a mouse brain connectome. The WG report suggests ample resources for the organization of science, including training opportunities to broaden the diversity of BRAIN researchers; and strategies to disseminate the emerging technologies and promote data sharing, aligned with a new policy for BRAIN awards.

This poster highlights the findings of the WG's report, as well as BRAIN scientific

advancements, tool and technology dissemination, and the myriad partnerships that constitute NIH's contribution to BRAIN. More details can be found at: www.braininitiative.nih.gov

Disclosures: **A.B. Adams:** None. **K.B. Dupre:** None. **G. Farber:** None. **J.A. Gordon:** None. **N.S. Hsu:** None. **W.J. Koroshetz:** None. **K.M. Ramos:** None. **E.M. Talley:** None. **S.R. Weiss:** None. **S.L. White:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.23SU/DD55

Topic: J.03. Public Awareness of Neuroscience

Support: Apple Bank

Title: University and nonprofit partnership: How science education benefits from pairing a large university and a small nonprofit

Authors: ***P. L. CROXSON**¹, L. WRIGHT², C. PAIGE¹, L. DINH¹, F. ANSELM², R. J. FRAWLEY, III², B. J. DUBIN-THALER², K. E. REMOLE¹;
¹Zuckerman Inst., Columbia Univ., New York, NY; ²BioBus, Inc., New York, NY

Abstract: BioBus at the Zuckerman Institute is a pairing between an academic research institute and a science education nonprofit. Both partners bring significant strengths to the collaboration. BioBus brings expertise in science education and Columbia provides access to a scientific community.

Columbia University's Zuckerman Institute is housed in a research building in Harlem, New York, with a dedicated, street level space for education and outreach activities. The Education Lab provides a flexible base for programs aimed at students, teachers, adult audiences and families. Set in West Harlem, New York, the location is ideal for serving the community in upper Manhattan and the South Bronx - primarily minority, underserved and low-income populations.

BioBus, Inc. is a nonprofit organization whose mission is to help minority, female, and low-income elementary, K-12 and college students in New York City discover, explore, and pursue science. Since 2008, over 250,000 students at more than 500 schools have discovered the thrill of scientific discovery, with many embarking on a path of scientific exploration and sustained pursuit.

BioBus has a home for their activities in Harlem in the Zuckerman Institute Education Lab, and has populated the space with advanced research microscopes. The Zuckerman Institute's full-time staff of two along with BioBus' extensive team of educators allow for programming to occur in the space 7 days a week. The institutional stability of a university combined with the

versatility of a nonprofit opens up access to new funding opportunities and collaborations. While sharing physical space and resources, we hold joint events, such as Saturday Science, a monthly family science day for families and community groups to explore neuroscience, led by scientists in an informal and highly interactive structure. Each institution contributes activities and resources to each event. We reach an average of over 130 participants each month, a total of over 1000 participants annually, 50% of whom are from our target zip codes in upper Manhattan and the South Bronx. These events allow participants to enjoy unique, fun science activities in an informal setting. They also pave the way for future direct collaborations between the Zuckerman Institute and BioBus.

Disclosures: P.L. Croxson: None. L. Wright: None. C. Paige: None. L. Dinh: None. F. Anselmi: None. R.J. Frawley: None. B.J. Dubin-Thaler: None. K.E. Remole: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.24SU/DD56

Topic: J.03. Public Awareness of Neuroscience

Title: The HEAL (helping to addiction long-term) objectives to advance pain research

Authors: D. HANEY, L. PORTER;
Natl. Inst. of Neurolog. Disorders and S, Bethesda, MD

Abstract: The public health significance of chronic pain and adverse effects of opioids reflects an enormous burden to individuals and the nation. Overdoses involving opioids resulted in the death of more than 42,000 people in 2016. At the same time, approximately 50 million US adults report having chronic pain and often lack effective treatments. These dual crises are intimately intertwined in that alternatives to opioids for pain management are needed to reduce our reliance on opioids. The NIH HEAL Initiative is an ambitious, trans-agency effort that spans the spectrum of basic, translational, and clinical research on opioid misuse, addiction, and pain. The NIH HEAL Initiative will accelerate and advance research efforts to address both issues. To improve our understanding of pain and improve care, HEAL is leveraging existing programs, establishing new infrastructure, and supporting a range of preclinical and clinical studies to accelerate development of new treatments and provide an evidence base for best clinical practices for many pain conditions. HEAL supports programs to accelerate early drug discovery, drug and device optimization, and preclinical testing and validation. The HEAL initiative will establish a pain clinical trial research network to support early phase trials to test safety and efficacy of novel drugs and devices and discovery research to identify biomarkers and endpoints to validate treatment target, stratify patient populations for research and treatment, and predict treatment response. NIH has engaged many partners from both the analgesic drug and device

development industry who will provide expertise, assets such as existing compounds which may have analgesic potential, and new compounds under development and testing through the HEAL infrastructure programs. The HEAL initiative also is establishing a pain effectiveness research network to support phase 3 effectiveness trials. This network will perform trials to test pharmacological, non-pharmacological and integrated treatments for many common pain conditions. NIH has planned carefully to optimize the benefits provided through HEAL with the ultimate goal of benefit to the patient.

Disclosures: **D. Haney:** None. **L. Porter:** None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.25SU/DD57

Topic: J.03. Public Awareness of Neuroscience

Support: NIMHANS

Title: Emotional intelligence and executive functions in children in conflict with law

Authors: ***B. VIJAY**¹, ***R. P. REDDY**²;

¹Clin. Psychology, NIMHANS, NIMHANS, India; ²Clin. Psychology, NIMHANS, Bangalore, India

Abstract: Background: Crimes over the last decade has risen significantly, not just in adults but adolescents and children as well. Children in conflict with law are those who below the age of 18 have been accused of committing a crime. It has been found that those with lower emotional intelligence, deficits in their executive functions and insecure attachment styles is a strong predictor of delinquent behaviours, though during this period of childhood and adolescence, their emotional intelligence and executive functions are still being developed. Studies have shown that there is a link between emotions and cognitions, where when emotions are well-regulated, support and maintain executive functions, but when it is poorly regulated, interferes with attention and decision making.

Aim: To examine emotional intelligence and executive functions in children in conflict with the law.

Objectives: To study the emotional intelligence, executive functions, attachment style, and their association and to formulate an intervention module with children in conflict with law.

Method: Cross-sectional design with quantitative analysis was used for the study. The study was divided into two phases, the pilot phase and the main phase. In the main phase after obtaining informed consent, a total of 27 adolescents in conflict with the law were recruited from the state-run observation home. 2 participants dropped out due to severe emotional disturbances. A total

of 25 participants as per the inclusion and exclusion criteria were recruited for this study. The study was divided into two parts, part 1 was the assessment phase and part 2 was the development of the intervention model based on the findings. The socio-demographic details were obtained from the adolescent, which consisted of questions relating to their experiences and attachment styles. Verbal N back, colour cancellation, animal naming test, matrix reasoning and block design was used to measure executive functions and Schutte Emotional Intelligence Scale was used to measure their emotional intelligence.

Results and discussion: The data was analysed using descriptive statistics, correlation, both parametric and non-parametric and t-test - parametric and non-parametric. It was found that working memory is positively correlated with emotional intelligence, attention was positively correlated with utilisation of emotions and anger dysregulation was found in all the participants. 90 % was found to have secure attachment with one caregiver, mainly their mothers. Intervention focusing on working memory training for better emotion regulation could be considered to help in building resilience as well as reducing recidivism.

Disclosures: **B. Vijay:** None. **R.P. Reddy:** A. Employment/Salary (full or part-time); Govt Employee.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.26SU/DD58

Topic: J.03. Public Awareness of Neuroscience

Title: Studying blood vessel architecture at capillary level in mouse brain

Authors: ***S. GUM**, M. HWANG, J. WON, E. LEE, Y. PARK;
Binaree, Daegu, Korea, Republic of

Abstract: Despite of its fundamental role, a detailed brain vasculature architecture at the capillary level remains elusive. In addition, the analysis of vasculature architecture is limited to 2D structures, with apparent limitations regarding the interpretation of vascular architecture. Here, we reconstructed the vascular structure of zebrafish and mouse whole brain using Binaree tissue clearing method combined confocal or light sheet microscopy and image analysis software. For vascular network staining, the Tomato-lectin staining was performed via intracardiac perfusion, and then tissues were transparent with Binaree tissue clearing method. As a result, the topology of branches of the microvasculature were able to be visualized, and 3D vasculature images from zebrafish and mouse brains were acquired. These results suggest that tissue clearing methods have a useful approach to acquire whole brain blood vessel images at capillary level. Thus, it can be applied to anatomical studies of numerous biological and medical specimens and may open up new vistas in brain research.

Disclosures: S. Gum: None. M. Hwang: None. J. Won: None. E. Lee: None. Y. Park: None.

Theme J Poster

026. Outreach Activities

Location: Hall A

Time: Sunday, October 20, 2019, 8:00 AM - 12:00 PM

Program #/Poster #: 026.27SU/DD59

Topic: J.03. Public Awareness of Neuroscience

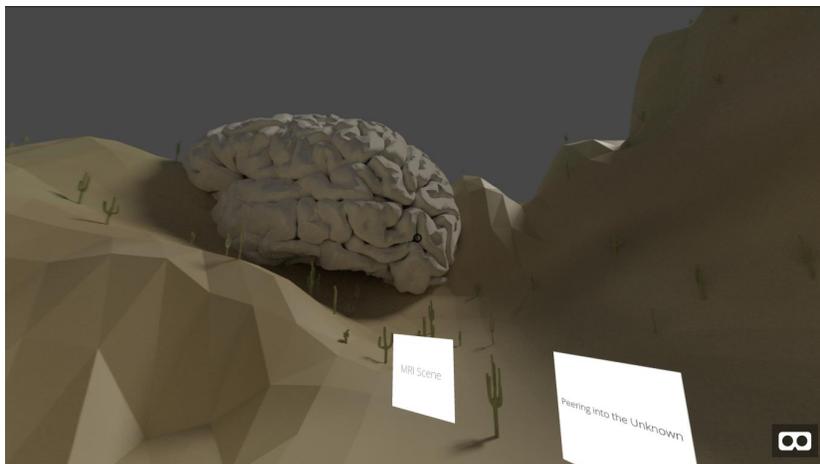
Support: University of Arizona Honors College Spirit of Inquiry grant

Title: Mental landscapes: Accessible virtual reality for neuroscience outreach

Authors: *D. BAYLY¹, J. LEVINE², J.-M. FELLOUS³;

¹Mathematics, ²Computer Sci., ³Psychology, Univ. of Arizona, Tucson, AZ

Abstract: The impact of technology in our lives is often overestimated in the short term, and underestimated in the long term. The cutting edge technology known as Virtual Reality (VR) is one of these. VR is overwhelmingly in use within entertainment, but that is not the limit of its potential. Within education VR has a wide range of possibility. The purpose of this project is to investigate what VR visualization techniques can accomplish in the domain of neuroscience outreach. The goal of the project is to create virtual reality exhibits featuring content from the macro, meso, and micro levels of neuroscience research. Resulting scenes are shared through web portal and in person outreach events in the Tucson Arizona community. The completed set of virtual scenes is assembled to form a curated set of neuroscience exhibits referred to in its entirety as the mental-landscapes museum. This report will cover conceptualization details, hardware/software choices, content creation workflows, and outreach debriefs of interest to those attempting novel neuroscience outreach of this variety.



Disclosures: D. Bayly: None. J. Levine: None. J. Fellous: None.