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[Authors]. [Abstract Title]. Program No. XXX.XX. 2018 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2018. Online.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.01SA/JJJ34

Topic: J.01. History of Neuroscience

Title: Eponymous women in neuroscience and medicine

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Abstract: Eponyms, terms based on the name of a person or persons, are commonly used throughout the English language. This is especially true for the medical and neuroscience fields. These terms can be derived from a variety of sources. Some eponymous terms are linked with a location (Lyme disease) or a famous patient (Lou Gehrig disease). Still others are associated with fictional characters (Oedipus complex). The majority of eponyms are associated with the person(s) involved in discovering the subject of the term, usually as an honorific, e.g., aqueduct of Sylvius. Fairly recently it was suggested that language be standardized to use the non-possessive form of the eponym, but this trend has not yet been universally accepted. Also, it has been suggested that the use of eponymous terms be abandoned altogether. One place that there seems to be a disparity is in the number eponyms named after women. The website: whonamedit.com has probably the largest collection of medical eponyms in a single place. There are 2894 names associated with eponyms on this site. Of these, only 102 are females, and 3 of these are fictional (Alice-in-Wonderland, Cinderella, and Mona Lisa). This means that female names make up only 3.6% of the names on this list. Of these names, there are 143 eponymous terms for different entities, since some names are the sources of more than 1 term. This site lists not only the most common eponym but also alternative eponyms for the same entry. Of the main terms, 31% used only 1 name, 12% used more than 1 name with the female name 1st in alphabetical order, 6% used more than 1 name with the female name 1st but not in alphabetical order, 13% used more than 1 name in alphabetical order with the female name not 1st, and 14% used more than 1 name not in alphabetical order with the female name not 1st. Of the alternate terms, 9% used only 1 name, 3% used more than 1 name with the female name 1st in alphabetical order, 1% used more than 1 name with the female name 1st but not in alphabetical order, 7% used more than 1 name in alphabetical order with the female name not 1st, and 4% used more than 1 name not in alphabetical order with the female name not 1st. For the terms which were not in alphabetical order, author order of the pertinent publication was followed in the vast majority. There are 5 blended names, 4 of which the husband's name comes 1st, but 1 in which the wife's name comes 1st. Most of the eponyms are relatively rare genetic disorders, but a few are rather famous including Apgar score, (Gerty) Cori cycle (for which she shared the Nobel Prize with her

husband, Carl), and HeLa cells (Henrietta Lacks). Maybe as gender equality in the workplace increases, there will be less disparity in eponymous terms associated with women.

Disclosures: B.W. Bakkum: None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.02SA/JJJ35

Topic: J.01. History of Neuroscience

Title: Lessons and guidance for contemporary neuroscience from historical sources: Examples from Shakespeare and Bach

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Abstract: Neuroscience has benefitted greatly from advanced technologies such as high throughput nucleotide sequencing, high resolution fMRI and multi-photon microscopy. However, historical sources can still provide information useful in addressing current issues in neuroscience, as well, modern approaches can be helpful in solving mysteries of the past and provide new future experimental tests. I illustrate this utility of historical sources with two examples: (1) Posttraumatic stress disorder (PTSD) affects eight percent of Americans sometime during their lifetime and a better understanding of PTSD may be helpful in finding novel useful treatments. Features of PTSD, e.g., nighttime awakenings in those who have suffered war trauma can be found as far back as ancient Sumerian texts. The first complete description of PTSD—indeed one completely encompassing DSM-5 criteria—was given by Shakespeare in Henry IV, Part 1, Act 2, Scene 3. Kate, wife of Hotspur soliloquizes about his odd behavior. Further, in the fourth line of the soliloquy, “Tell me, sweet Lord, what is’t that takes from thee/Thy stomach, pleasure, and thy golden sleep,” Shakespeare highlights that PTSD is a distinct nosologic entity, and one that is not understood. (2) JS Bach is not only considered one of the greatest and most important composers, but also Bach’s music is performed and listened to frequently. Curiously, due to an apparent dearth of performance markings and indications in Bach’s scores it would seem that we do not know how to perform the music as Bach wanted or even if there was a specific preferred way Bach intended it to be played. In particular, because 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, utilizing a recent psychophysical study, recovering Bach’s absolute tempos, despite the lack of metronome indications, may be possible. Indeed, in Bach’s time there was a well-appreciated idea of a *tempo ordinario* (TO) or default tempo. This was the tempo 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 and presto twice as fast. Quinn and Watt (Perception, 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 of Quinn and Watt could be used to establish the TO, see if it is universal across Bach's opus and use the speeds implied by the proportional ratios (e.g., BWV 151/1) for other tempos as tests of this method.

Disclosures:

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.03SA/JJJ36

Topic: J.01. History of Neuroscience

Title: A biological perspective of depression and psychological processing in spinal cord injury

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Abstract: Spinal cord injury (SCI) is one of the most devastating types of neurological disorders, resulting in a loss of nervous tissue that affects motor, sensory, and autonomic function. For a disease that poses significant medical, psychological, and economic challenges for patients, research on both curative treatment and quality of life optimization is of particular importance. Depression is common following SCI and is associated with worse functional outcomes, increased medical complications, and higher healthcare costs. While depression has been studied extensively from a psychosocial perspective in the context of SCI, investigation of biological dynamics is rare. Given the transdiagnostic nature of somatic symptoms in SCI and major depressive disorder, the symptom-based Diagnostic and Statistical Manual (DSM) classification system poses certain limitations. The structure of the NIMH Research Domain Criteria (RDoC), however, facilitates transdiagnostic and translational work that can be grounded in post-SCI molecular, cellular, and neurocircuitry-level modifications. This study reviews the biology of depression and psychological processing in SCI in human and animal models, and proposes the RDoC as a theoretical framework for future research.

Disclosures: R.E. Asher: None. **R.G. Fessler:** None. **B.T. David:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.04SA/JJJ37

Topic: J.01. History of Neuroscience

Support: DFG Grant Gl 342/3-1
DFG Grant SH 166/3-1

Title: 150 years of Vierordt's law: The role of experimental protocol

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Abstract: 150 years ago, in 1868, Karl Vierordt, professor of physiology at the University of Tübingen, published his book "Der Zeitsinn nach Versuchen" (The sense of time according to experiments) in which he reported various experiments on the perception of time. His main finding, an overestimation of long durations and underestimation of short durations, has been termed Vierordt's law in time research. In other domains, similar results of systematic magnitude-dependent biases are known as "regression effect" or "central tendency" (Hollingworth 1910). While Vierordt's law was considered as unexplained problem still 10 years ago, in the last few years Bayesian modeling was found to explain the central tendency (for review see Shi et al. 2013, Petzschner et al. 2015). Here we asked whether Vierordt's original results can indeed be explained by the Bayesian model. We show that this is the case with astonishing accuracy and present successful simulation of yet unexplained datasets from other domains such as spatial navigation. We conclude from a comparison of datasets and modeling results that Vierordt's law (and the central tendency) are a result of the specific experimental paradigm of presenting many trials with largely different magnitudes within exactly the same context. This protocol deviates from what usually happens in normal life, where either successive magnitudes are equal and share the same context, or different magnitudes are also associated with different contexts. The proposed underlying mechanism of Bayesian iterative updating indeed improves performance over trials for equal or similar magnitudes but is not appropriate for largely different magnitudes. To validate this, we ran a duration reproduction study, in which we manipulated the trial-to-trial variation while maintaining the whole sample distribution unchanged. We observed smaller reproduction errors with less trial-wise variation compared to the condition with complete random sampling. According to our analysis, 150 years of research have thus focused on an effect that was caused by an unnatural but widely used experimental protocol, which was introduced by Fechner (1860).

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Disclosures: Z. Shi: None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.05SA/JJJ38

Topic: J.01. History of Neuroscience

Support: NIH/NINDS Grant R00NS089938

Title: Adult hippocampal neurogenesis in humans: Controversy and opportunity

Author: *J. D. RIESKAMP, J. K. DENNINGER
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Abstract: Twenty years after the first report of human adult neurogenesis, whether the human hippocampus continues to add new neurons in adulthood remains controversial. It is now well accepted that in the hippocampal dentate gyrus of adult rodents and other mammals, new neurons are continuously produced and functionally integrate into existing brain circuits to modulate cognition and possibly other functions. However, demonstrating the perseverance of neurogenesis in the adult human hippocampus has been more elusive, as evidenced by contemporary studies using histological examination of human tissue, which reach opposing conclusions. The current controversy is galvanizing the field to re-examine methodology used to support or refute adult neurogenesis in humans and to refine hypotheses regarding potential species differences in the production, maturation, and function of adult-born neurons. Future studies of human neurogenesis will likely provide some clarification, but in the meantime, researchers must reconcile uncertainty about the role of adult-born neurons in the human nervous system with ongoing work attempting to leverage neural stem cells for therapeutic purposes. Here, we will review studies emerging from the last two decades of research on human adult neurogenesis and highlight the strengths and limitations of their various techniques. Finally, we will discuss the opportunities that a renewed vigor in the field brought about by the current controversy might offer for enhancing our understanding of human nervous system plasticity and repair.

Disclosures: J.D. Rieskamp: None. **J.K. Denninger:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.06SA/JJJ39

Topic: J.01. History of Neuroscience

Title: N- acetylaspartate: Historical background and clinical significance of unique cns molecule

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Abstract: N-acetyl aspartate (NAA) is the second most abundant molecule in the brain which was first discovered byTallan and colleagues in 1956. The researchers separated protein free extracts from cat brain through ion exchange column and found out that late ninhydrin negative extract was positive and thus discovery of NAA was made. Almost a decade later in 1965, Curatolo and colleagues demonstrated ninhydrin negative fraction contained aspartate and glutamate after acid hydrolysis. However, further research did not come till mid 1980's when Coyle and colleagues demonstrated the role of NAA in neuropsychiatric disorders. Despite more than 50 years of research, its role in the brain remains controversial, and hypotheses include (but are not limited to) the following: 1) an osmolyte to remove water from neurons, 2) an acetyl source for myelin lipid synthesis, 3) a mitochondrial energy source and 4) a precursor for N-acetylaspartyl glutamate. NAA represents the highest peak in nuclear magnetic resonance spectroscopy and decrease levels seen in Alzheimer's disease, schizophrenia, amyotrophic lateral sclerosis, multiple sclerosis, AIDS, traumatic brain injury , stroke and gliomas. One major exception is Canavan disease which involved accumulation of NAA due to genetic defect of the degradative enzyme aspartoacylase. Dr. Reuben Matalon's research group discovered this genetic defect. Based on these findings, investigators like Dr P. Leone promoted gene therapy in 1990's as potential cure of CD but outcomes were not that favorable. NAA is associated with lipid synthesis and myelination. Much work has been done by Namboodiri and colleagues since 1990's about significance of NAA in Canavan disease and traumatic brain injury and acetate supplementation as a potential cure based on animal studies. This molecule still remains a mystery despite the progress in research which make take decades to unfold.

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

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.07SA/JJJ40

Topic: J.01. History of Neuroscience

Title: Animal cognition: historical congruence of phenomenology and neuroscience

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Abstract: Understanding the relationship between the body and the mind has been a challenge since antiquity. Toward the end of the 19TH century, a new movement (phenomenology) that placed emphasis on the primacy of perception as an interactive and embodied experience gained traction in philosophy, at the same time that neurologists were beginning to accrue evidence on the coherence between brain function and the organism's interaction with its environment. Through the 20TH century, variations developed within phenomenology, but several themes predominated: an emphasis on the embodiment of experience, enaction by the organism of the world it inhabits, the importance of mobility, and a growing appreciation for the spatial and temporal dimensions of experience. Meanwhile, neuroscience was providing a detailed functional dissection of the brain, revealing the importance of topological organization and the active nature of perception and attention. As the third decade of the 21st century approaches, most phenomenologists maintain their skepticism that reductive materialism can provide an adequate explanation of subjective experience, while neuroscientists are wary of any attempts to explore subjective experience beyond the bounds of a strict physicalism. And yet, the philosophy of phenomenology and the science of brain function are converging in a few important ways: both are viewing cognitive function as an active interaction between organism and environment; both see perception and consciousness as an embodied process experienced by the organism as a whole; and both are emphasizing the species-specific and eco-specific factors that uniquely shape the experience of each organism. It is generally agreed by philosophers and neuroscientists alike that the biological basis of animal cognition, whatever form it takes in any given organism, has been shaped by the normal forces of evolution.

Disclosures: L.N. Irwin: None. **B.A. Irwin:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.08SA/JJJ41

Topic: J.01. History of Neuroscience

Title: Effect of rabies virus infection on the expression of calbindin and parvalbumin on mouse cerebellum: Raising awareness to integrate neuroscience and virology

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Abstract: Background: Rabies virus: RABV, is frequently transmitted from a bite or scratch of an infected animal, mostly dogs. From the motor endplate previously bitten, the virus is transported to the motor neurons in the spinal cord and finally to the brain by a retrograde route. Morphological changes in patient's brains infected with rabies virus are not evident and different studies have pointed out that in natural conditions RABV does not induce cell death but rather a neuronal dysfunction. There are clinical signs of rabies and experimental evidence from cell culture and laboratory animals that suggest a possible involvement of the gabaergic system during rabies virus infection. Calbindin: CB, and Parvalbumin: PV, are calcium binding proteins which regulate the effect of calcium ions on intracellular metabolism, both are markers of gabaergic cells and rabies infection caused loss of immunostaining for CB but increase of immunoreactivity of PV, in frontal cortex, corpus striatum and spinal cord of mice. However, due the relation with the motor system, the cerebellum cells from infected mice were analyzed. **Objective:** To evaluate the localization of CB and PV and the expression levels in cerebellum from rabies-infected mice. **Methods:** Four-week -old mice were inoculated intramuscularly in the hindlimb with rabies fixed virus CVS: Challenge Virus Strain, and other mice only with vehicle solution. When the mice reached the terminal state of illness, the groups were divided according with the procedures: immunohistochemistry: IHC, western blot, RT-qPCR. **Results:** The IHC showed clear PV-stain for Purkinje cells, and stellate/basket cells and CB stain only in Purkinje cells, however not changes between infected and control mice were found. The preliminary results with western blot and RT-qPCR did not show changes in expression levels of both proteins. **Conclusion:** These results suggest a neuronal selective vulnerability of the RABV infection, affecting differently some regions of the Central Nervous System of mice that not include the cerebellum.

Disclosures: J.R. Naizaque: None. **Z. Duenas:** None. **O. Torres-Fernández:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.09SA/JJJ42

Topic: J.01. History of Neuroscience

Title: Anomalous pattern of earthworm use in behavioral research

Author: *W. J. WILSON
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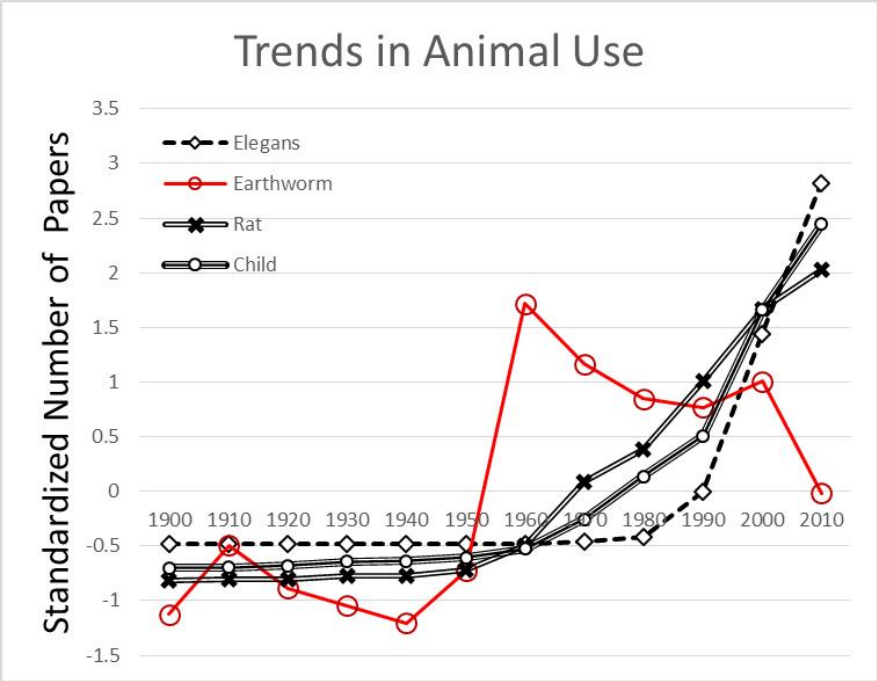
Abstract: In 2010 I reviewed the use of earthworms in behavioral neuroscience research for the past century. My intent here was to examine in a quantitative way how this had changed over time. The project grew into an analysis of the use of many different animals in behavioral research in general, and led to the recognition that seminal papers often drive the choice of species to examine.
PsycINFO was searched from 1900-2019 for any peer-reviewed articles that listed a particular animal in the Abstract field. Not surprisingly, the number of articles increased over the course of this time period, with a search for "rat," for example, yielding >124,000 hits, 10 in the decade from 1900-1909, and 31,705 from 2000-2010. "Child" yielded >390,000 hits, 156 from 1900-1909, and 109,061 from 2000-2009. Number of papers using rats or children tended to grow exponentially across time. Earthworm papers yielded a different, non-smooth pattern. "Earthworm" resulted in a total of 133 hits, 1 from 1900-1909, and 18 from 2000-2009; pre-960 there were 0 - 9 papers per decade, and after 1960 there were 15 - 27, with the peak of 27 occurring in the 1960s. "Elegans" resulted in 980 papers, with nothing before 1955 and only 18 before 1990. The poster will present the data for the following search terms (and perhaps others): elegans, earthworm, cockroach, fish, pigeon, rat, cat, dog, child.The graph shows number of papers per decade (standardized as z-scores) for some animals. Usage tends to increase exponentially for most animals. Earthworm use is anomalous, not revealing the typical exponential growth.



Disclosures: W.J. Wilson: None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.10SA/JJJ43

Topic: J.01. History of Neuroscience

Title: The evolution of defining pain

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Abstract: Although a universal experience, the nature of pain has always been puzzling to conceptualize and even more elusive when attempting to define it. Historically, concepts of pain have swayed back and forth between either a sensory or emotional view and have given rise to a multitude of theories to further understand the complexity of pain. Beginning with Hippocrates and ending with the current definition set forth by Internal Association for the Study of Pain, the interpretations of pain have emphasized important characteristics, but have also failed to encompass the holistic perception of pain. While there has been much evolution regarding the definition of pain, this historical review of pain will focus on the strengths and weaknesses in successfully defining pain, while highlighting the importance to further define pain in order to fully understand it in its entirety.

Disclosures: C.A. Salcido: None. **M.K. Geltmeier:** None. **P.N. Fuchs:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.11SA/JJJ44

Topic: J.01. History of Neuroscience

Title: Taking phenomenology seriously: The ubiquity of first-person experience in the cognitive sciences

Author: *S. M. RENNIE, J. RIGATO, Z. F. MAINEN
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Abstract: Since the fall of classical introspectionism over a century ago, the place of subjective experience in scientific explanation has been generally viewed with much suspicion. In the past few decades, several authors have insisted on the need to revalue first-person experience, arguing

against its neglect in cognitive science. Here, we present a contrary position: that first-person experience has always been and remains ubiquitous in cognitive neuroscience, even if it is not always recognized as such. According to the terminology proposed here, second-person methods are methods whereby subjects intentionally attempt to communicate their private experiences to another person through public reports. These reports vary greatly in their dimensionality, ranging from binary button presses to free speech, and do not necessarily rely on introspective skills. This viewpoint stems partially from a review of the landscape of current research, based on a set of papers sampled from the cognitive and neuroscience literature. We rated the papers on sixteen axes, regarding different experimental aspects, from the time interval between experience and report to the neural information collected. Our evaluation suggests that, despite their heterogeneity, studies have in common a practical reliance on second-person methods, which may or may not be explicitly acknowledged. A clustering algorithm allowed us to group methods according to the similarities in their ratings on the various axes. Interestingly, this analysis showed clusters to depend more on the behavioral constraints imposed by the experimental setup than on the degree to which studies leverage first-person experience, which was quite variable within each cluster. We interpreted this as showing that there is not a division, in cognitive science, between methods that depend on subjective reports and methods that do not, but rather a distinction between methods that endow experimental subjects with behavioral flexibility (and typically more freedom of speech), and methods where subjects are highly constrained, both in the task and the report. We suggest this distinction between flexible and constrained studies depends on the questions asked and phases of research. We argue that first-person experience ought to be, and is being, explored with different methods, which means that the debate regarding the place of phenomenology in cognitive science should be reframed. First-person experience and second-person methods have always been the basis for cognitive science, but only by understanding their role in the foundation of knowledge about cognitive processes can they be harnessed most effectively.

Disclosures: S.M. Rennie: None. **J. Rigato:** None. **Z.F. Mainen:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.12SA/JJJ45

Topic: J.01. History of Neuroscience

Title: Systems views in neuroscience: From input/output analysis to situated cognition

Author: *J.-C. LETELIER, C. H. MAUREIRA, *J.-C. LETELIER
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Abstract: The desire to obtain general principles in the organization and functioning of the nervous system has been a important quest in neuroscience research. However, also spread among practicing neuroscientists is that neuroscience lacks formal unifying principles. Work must continue to focus on experimental findings and describing new phenomenas at molecular, neuronal, circuits and systems levels, as the biological world is not amenable to “Laws” or “Principles”.
However, under a systems perspective, mathematics, physics and biology take common roots, but not only in the general reductionist versus holistic approach: an abstract, powerful and integrative approach represented by the systems perspective ties to neuroscience a core of conceptual, methodological and theoretical developments. In this perspective, theoretical neuroscience, continuing after McCulloch and Pitts needs to overcome computer science`s metaphor to obtain general quantitative principles to understand neural and brain functions. Moreover, a systems perspective in combination with more subtle ideas about the interaction between organism and its environment (Umwelt, Affordance, Operational Closure), brings forward a new stage of theoretical descriptions.
Here we describe historical developments and theories relating both approaches. Interestingly, Maturana and Varela theory of Autopoiesis and Cognition (1972, 1983, 1991); Haken’s Synergetics (1983) and Karl Friston`s Free Energy Principle (2003, 2006, 2012) among others, can be understood in a more general framework. In effect, using a systemic perspective we have proposed a Quantitative Autopoiesis & Cognition Framework (QuA&CF) that entails a mechanical, statistical, and geometrical theory on self-organization, self-construction and self-reference for living systems. Based on the notions of Closure and Structural Coupling, from biological systems, we integrate pure and applied Mathematics to a new perspective in Neuroscience. In effect, biological systems, as well as nervous systems, become tied in a systems perspective with common grounds of mechanical and dynamical systems with situated cognition as an emergent feature.

Disclosures: C.H. Maureira: None. **J. Letelier:** None.

Theme J Poster

021. History of Neuroscience

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 021.13SA/JJJ46

Topic: J.01. History of Neuroscience

Title: Operational closure in the nervous system

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Abstract: The prevailing view of the nervous system is that of a neuronal network organized as a data processing system that receives inputs (perceptions), operates on these inputs (cognition), and produces a coherent output (actions). This computer metaphor has profoundly impacted neuroscientists who have uncritically adopted notions like “information”, “processing”, “data”, “code” and "efficiency". Nevertheless, alternative viewpoints challenge this shared intuition that interprets brain function and behavior from the perspective of engineering and optimization principles.One alternative approach was conceived fifty years ago by Humberto Maturana, in his technical report *Neurophysiology of Cognition*, written at the Biological Computer Laboratory of Heinz von Foerster in 1968. In this report, he proposed a constructivist approach to understand brain functions. According to Maturana, the goal of the nervous system is not to detect and codify reality and produce optimized behaviors, instead the nervous system continuously creates coherent sensori-motor correlations in a process called *Operational Closure*. The nervous system sharpens these multidimensional sensori-motor coherences by engaging in behaviors that define the objects encountered by the organism solely by the maintenance of the organism’s internal correlations, thus being operationally closed. This relational definition of external objects is called *Biology of Cognition*, and was the basis for Maturana and Varela’s *Theory of Autopoietic Systems*, a self-referential view of cellular metabolism and multicellular interactions. The non-orthodox proposals of Biology of Cognition have gained attention, as they encompass classical ideas about organism-medium interactions, such as Von-Uexkul’s *Umwelt* and Gibson’s *Affordance* as well as modern theories of situated cognition: Varela’s *Enaction*, Jonas’ *Modern Biosemiotics*, Noe’s *Action-Perception loop* and Friston’s *Free Energy Principle*. Critics of Biology of Cognition point to its lack of quantitative results. However the oceanic amount of data we currently collect has not provided true explanatory power, as Claude Shannon remarked when cautioning against the use of Information Theory outside Telecommunications. Operational closure -maintenance of internal correlations defined by the history of mutual interactions spite external perturbations- is the main conceptual shift introduced by Biology of Cognition. This shift provides a framework to understand the nervous system without requiring a twentieth-century, man-made technology as pivotal reference.

Disclosures: F.J. Flores: None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.01SA/JJJ47

Topic: J.02. Teaching of Neuroscience

Title: The teenage neuroscience initiative of the future

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Abstract: The International Brain Bee (IBB) is the global neuroscience competition for teenagers. Its purpose is to inspire and motivate young people to pursue careers in neuroscience, neurology, psychology and other brain-related professions. This year, the IBB, founded by **Dr. Norbert Myslinski** of the **University of Maryland, Baltimore**, is celebrating its 20th anniversary and also celebrating the 1st year of being incorporated as a not for profit corporation. Five neuroscience organizations are taking a leadership role and investing their energy, time, resources and funds to make the IBB better than ever, now and into the future. They are the **Society for Neuroscience (SfN)**, the **American Psychological Association (APA)**, the **Dana Alliance for Brain Initiatives**, the **Federation of European Neuroscience Societies (FENS)**, and the **International Brain Research Organization (IBRO)**. The IBB currently includes of 200 chapters in 50 countries in 6 continents. Teenagers compete at the chapter level, advance to the national level, and then to the annual World Championship. Past venues for the World Championship include **Baltimore, United States; Montreal, Canada; Toronto, Canada; San Diego, United States; Florence, Italy; Cape Town, South Africa; Vienna, Austria; Washington, United States; Cairns, Australia;** and **Copenhagen, Denmark.** Past hosts of the World Championship include the **World Congress of Psychology**; the **World Congress of Neurology**, the **International Society for Neurochemistry**; the **Canadian Neuroscience Society**; and the **University of Maryland, Baltimore**; as well as the leadership organizations FENS, IBRO, and APA. Local coordinators are neuroscientists, neurologists, teachers and administrators from high schools, museums, and industry who are interested in science education and community outreach. Sponsors include colleges, universities, foundations, museums, institutes, societies, and commercial companies and businesses. More than a hundred newspapers, radio and television stations now cover the IBB and its student competitors, and about 50 web sites are devoted to IBB chapters. Winners have been recognized by Presidents and Ambassadors of countries around the world. Many former competitors are now working in neuroscience, neurology, psychology and related fields. The IBB welcomes their continued participation as well as organizations and individuals who are interested in IBB activities, whether it is to further educational, outreach, advocacy or humanitarian goals extending from the local to international levels. According to the Founder: “The IBB Builds Better Brains to Fight Brain Disorders.”

Disclosures: N.R. Myslinski: None. **K. Roina:** None. **C. Mason:** None. **L.V. Kristiansen:** None. **M.P. Witter:** None. **R. Hadid:** None. **T. Asakawa:** None. **G. Fowler:** None. **R. Diaz-Brinton:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.02SA/JJJ48

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant P50 DA039841
NIH Grant 1F31NS100328

Title: Think outside the blocks: Teaching the genetic, biological, and behavioral basis of addiction to high school students using LEGOs

Author: *E. L. SPAULDING[1,2], A. GALLUP[1], R. DENEGRE[1,3], P. DICKSON[1], K. LONG[1], K. FUNKHOUSER[1], M. MCOSKER[3], J. KADIN[1], E. J. CHESLER[1,2]
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Abstract: Adolescent drug and alcohol use occurs at an alarming rate despite widespread prevention efforts. Current substance use education primarily focuses on abstinence and stopping the initiation of drug use, but remains largely ineffective. However, in addition to the risks associated with experimental drug use, a subset of adolescent users will go on to develop drug and alcohol addictions. Little educational focus is put on how initiation of use during adolescence can result in a disorder of addiction characterized by compulsive drug use despite negative consequences. Furthermore, because addiction does not develop along a predictable continuum and use of drugs does not lead to addiction in all individuals, adolescents may benefit from understanding what contributes to vulnerability from a biological perspective. Given the high heritability of addiction, there is a need to enhance awareness about the influence of genetic variation on addiction. Thus, we seek to teach high school students the genetic, biological, and behavioral mechanisms leading to drug addiction, with the intention that they learn to recognize the early signs of addiction in themselves and in their peers. To this end we have developed an educational intervention that uses LEGOs™ to demonstrate how modern genetic studies and behavioral experimentation have informed research in drug and alcohol addiction. Students use LEGO™ mini-figure populations to model one of the first genome-wide association studies to link a genetic locus with an addiction-related trait. We have also designed a working, programmable, dual-retractable lever operant conditioning apparatus (Skinner box) using LEGO™ Mindstorms robotics. Students experiment with this system to learn the behavioral principles of operant reinforcement and how they contribute to the compulsive reward seeking that characterizes drug and alcohol addiction. This educational program is currently being piloted within high school biology classrooms in the State of Maine. Changes in student perceived risk

and disapproval of experimental and regular substance use will be used to evaluate the degree of effectiveness of the program as a substance use intervention.

Disclosures: E.L. Spaulding: None. **A. Gallup:** None. **R. Denegre:** None. **P. Dickson:** None. **K. Long:** None. **K. Funkhouser:** None. **M. McOsker:** None. **J. Kadin:** None. **E.J. Chesler:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.03SA/JJJ49

Topic: J.02. Teaching of Neuroscience

Support: NSF EEC-1028725

Title: Evaluating neural engineering education programs using a common assessment tool

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Abstract: A common assessment survey tool was created as a way to gather demographic data, neuroscience and neural engineering skill set outcomes, and learning outcomes across multiple education programs occurring at three geographically dispersed partner sites of a neural engineering research center. These education programs included pre-college and university-level audiences. This survey tool allowed program managers to work with the Center's external evaluator to construct a custom online survey using items from a common question bank and receive reports of results through a single point-of-contact. The use of a question bank ensured consistency in survey constructs and items, allowing for comparison across programs and sites. The Center education team met with the external evaluator to discuss what questions should be included in the question bank. These questions were divided into categories of demographics, neural engineering skill sets, and qualitative inquiry regarding learning outcomes. Questions were modified over time based on participant feedback and as new materials were added. From 2015 through early April 2018, surveys developed using the common assessment tool were administered by program managers to 2,161 program participants across three sites: the University of Washington, San Diego State University, and Massachusetts Institute of Technology. Retrospective knowledge gain skill set data were analyzed in SPSS to produce descriptive statistics, including mean comparisons, change scores, and statistical significance. Program-specific evaluation data were shared with the program managers and aggregate data were available to Center leadership for program review and annual reporting to the funding agency. For example, respondents' perceptions of their knowledge on a 5-point Likert scale

("Hardly Anything" to "Extensive") were statistically significant ($p < .001$) before and after the Center programs in which they participated for all skill sets: knowledge of core concepts in neural engineering, neuroscience, engineering, and neuroethics; designing experiments in neural engineering; ethical and responsible conduct of research in neural engineering; and analysis and interpretation of neural engineering data and results. Because all work for this effort is coordinated through The Center for Research and Learning, the common assessment tool has alleviated the need to hire an external evaluator at each of the sites to conduct and coordinate these surveys. In addition, the use of the common assessment tool has allowed Center leadership to review program outcomes and results using consistent metrics.

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

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.04SA/JJJ50

Topic: J.02. Teaching of Neuroscience

Support: King's Global, King's College London

Title: Neuroanatomy explorers: International exchange through edu-gaming

Author: *R. J. WINGATE[1], L. J. WILSON[2], *R. J. WINGATE[1]
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Abstract: We have established a broad outreach programme that uses science as a means of exchanging of cultural perspectives in school students. We chose neuroanatomy as a subject for children in year 4 and 5 (8-10 yrs old) to explore in an Anglo-Indian partnership facilitated by post-doctoral researchers and PhD students at NCBS, Bangalore and King's College London. Two classes of 8-year old children, one in London, UK and one in Bangalore, India, were chosen to pilot our Explorers programme. Explorers uses the co-creation of a deck of trading and playing cards as a means of exchanging ideas and concepts in evolutionary adaptation. We wanted children to think about how brain and body design reflects the niche in which animals live using edu-gaming as a means of trading perspectives. Students were first given a workshop on the brain and body systems. They were then asked to imaginatively project the neural and anatomical adaptations to these systems that would allow them to optimally colonize different imaginary niches (water, ice, space etc.). This might include, for example, increased visual acuity, motor or enhanced sensory systems. The students were asked, on the basis of their adaptations, to divide 200 "points" amongst 5 categories corresponding to: intelligence, strength, love, aggression, size. They were then asked to draw and name their avatar. Drawings were used to make playing cards from each school and combined into a single deck. The game, based on

"Top Trumps", pairs cards which are then won or lost on the basis of score in a particular category. Students quickly identify which cards are winners and loser and become familiar with each other's avatars. The decks from India and the UK and hence different perspectives on brain and body are then combined onto the neutral playing field of a card game. Young people establish contact via a platform that, if not entirely free, is at least alert to cultural preconceptions and bias. Our pilot establishes a bridge between UK and Indian schools and scientists and creates a bridge for developing more sophisticated science exchange. In time, we want students to co-design experiments that will allow them to see each other's world through the lens of scientific observation and experimentation.

Disclosures: L.J. Wilson: None. **R.J. Wingate:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.05SA/JJJ51

Topic: J.02. Teaching of Neuroscience

Title: Extracurricular biology research in a high school setting

Author: N. J. AMIN[1], A. S. KRISHNAN[1], P. B. NEWCOMBE[1], *R. D. FIELDS[2]
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Abstract: At Sidwell Friends Upper School, student research is encouraged at all levels. Rising ninth graders have the option to take an accelerated course, Biology 1A, in which the students spend much of their academic year planning, designing, and conducting their Independent Research Projects (IRPs). Students conduct various experiments on the development and behaviors of a variety of model organisms. By reading scientific literature, designing protocols, and partnering with scientists, students are able to refine their experimental designs and analytical procedures. This year, students' projects include: (i) studying the effect of melatonin dependency on zebrafish circadian rhythm patterns, (ii) using large-scale data to support the conservation of endangered Black-cheeked Ant-Tanagers, (iii) locating the gene responsible for the migration of painted lady butterflies, (iv) observing the effect of GABA inhibition on zebrafish retinal regeneration, (v) the impact of ethanol on zebrafish motor development, (vi) the effect of metformin on zebrafish endocrine disruption, (vii) the effects of various stimulants and depressants on zebrafish muscle structure, (viii) identifying migratory genes in the American Shad using magnetoreception, and (ix) studying the toxic effect of palladium on the embryonic development of zebrafish. These projects have proven to be a useful teaching tool: not only do these experiments help students learn more about biology, they also encourage them to pursue research beyond the classroom.

Disclosures: N.J. Amin: None. **A.S. Krishnan:** None. **P.B. Newcombe:** None. **R.D. Fields:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.06SA/JJJ52

Topic: J.02. Teaching of Neuroscience

Support: Dean's Innovation and Education Fund Grant from the University of Arizona

Title: The CogNeuro Bootcamp - An education and outreach project for high schoolers and college students

Author: *R. C. WILSON, K. CALDERON, A. FRISVOLD, Z. HAKIM, J.-M. MIZELL, N. PENA, A. SKUPNY, S. SYLVESTER
Univ. of Arizona, Tucson, AZ

Abstract: The CogNeuro Bootcamp is a two-week program developed and taught by undergraduates at the University of Arizona that aims to give high school students hands on experience in a cognitive neuroscience lab. This program offers educational opportunities for both sets of students. For the high schoolers, the program will introduce them to cognitive neuroscience and coding through a series of lectures and hands on experiments. For the college students, the program will give them an opportunity to engage in science teaching, community outreach, and develop their computational skills. We hope that for both sets of students the bootcamp will instill a sense of excitement for cognitive neuroscience!
The two week program will be run in Summer 2018 and involves both a lecture and lab component.
The lectures will provide an overview of key topics in cognitive neuroscience including basic neuroanatomy, brain research techniques, vision and perception, memory, computational neuroscience, artificial intelligence, and decision making. These presentations will be designed and delivered by the undergraduates in the program to help them develop both their knowledge base and presentation skills. Alongside these content-based lectures, there will also be several discussion panels in which graduate and undergraduate students to talk about their specific work in the lab and about college life in general. These panels are meant to inspire participants to pursue higher education and to foster an interest in neuroscience and its related fields.
The lab component of the bootcamp will give participants hands-on experience designing, building and running behavioral experiments using MATLAB and Psychtoolbox. Each lab session will be organized around a single task (e.g. displaying images on screen). Across sessions, these tasks will build into a larger project in which students learn to build their own behavioral task (e.g. “Dog Tinder” in which subjects indicate preferences between two dog

pictures) and analyze the behavioral data from other students performing their task. Going forward, we hope to make materials for the bootcamp (e.g. code, lectures etc ⋯) publically available so that others can run CogNeuro bootcamps of their own!

Disclosures: K. Calderon: None. **A. Frisvold:** None. **Z. Hakim:** None. **J. Mizell:** None. **N. Pena:** None. **A. Skupny:** None. **S. Sylvester:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.07SA/JJJ53

Topic: J.02. Teaching of Neuroscience

Support: SFN Chapter Grant to Shane Perrine
SFN Chapter Grant to Thomas Fischer

Title: Engaging the Metro-Detroit community and youth in interactive neuroscience-related activities

Author: *K. KARAVIDHA[1], L. E. CHABY[1], S. KULKARNI[3], T. FISCHER[2], S. A. PERRINE[1]
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Abstract: To raise awareness of the brain, our laboratory and colleagues from Wayne State University hosted a number of school and community events in the Metro-Detroit area in 2018. Here, we focus on two brain-awareness events that achieved great success, including 'Brain Day in Detroit' and a partnership with the Northville High School Neuroscience Club to provide outreach at Meads Mill Middle School in suburban Detroit. With the student-run Neuroscience Club at Northville High School in Northville, MI, we arranged an afternoon visit to facilitate interest in the brain to 6-8th graders and provide high school students with mentoring opportunities. We organized several interactive stations in a middle school classroom to demonstrate functions of the brain, basic neuroanatomy, the five senses, and the role of conditioned learning in neuroscience research. At the neuroanatomy station, participants were able to see and touch human, sheep, and rat brains while an undergraduate and postdoctoral fellow taught students about brain regions and their function. Other interactive stations included 'stump a neuroscientist', where students had the opportunity to ask PhD-neuroscientists questions, as well as a station that used Backyard Brains resources to model neural activity. In expanding our role in the Detroit community, students and neuroscientists from Wayne State University along with colleagues from Henry Ford Hospital and University of Detroit Mercy participated in an annual event held at the Michigan Science Center called Brain Day in Detroit.

This outreach event featured research demonstrations and a ‘steminista’ panel highlighting contributions of female neuroscientists. These activities were held during Brain Awareness week to provide the Detroit community with opportunities to learn about the brain through demonstrations and stations integrated into the permanent exhibits of the science center. The use of interactive exhibits provided children and their caregivers with an entertaining and engaging experience to learn more about neuroscience. We are excited to spread awareness of neuroscience research to the Detroit-area because it increases public support and fosters interest in youth.

Disclosures: K. Karavidha: None. **L.E. Chaby:** None. **S. Kulkarni:** None. **T. Fischer:** None. **S.A. Perrine:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.08SA/JJJ54

Topic: J.02. Teaching of Neuroscience

Title: Engaging students in neuroscience research: Implementing feasible inquiry-based investigations in K-12 schools

Author: *L. THOMPSON[1], N. FERRARO[1], M. P. REILLY[1], S. R. GUARIGLIA[2]
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Abstract: Providing students with instruction and infrastructural resources for independent and creative investigations earlier in their educational increases student preparedness, interest, and retention in scientific disciplines. Therefore, the goal of our program is to increase interest and preparedness for higher education and beyond, by implementing a cost-effective research program in which students can actively engage in scientific investigations of their choosing. Conceptually and infrastructurally, our program utilizes dedicated research space, qualified teacher-research personnel to guide research, and experimental design and endpoints that could be easily performed by high school students. We have found that using small, invertebrate organisms as models in combination with fundamental histology and behavioral techniques, garnered interest in research and has significantly increased the number of our students enrolling in university as biology and neuroscience majors. We have attempted to implement studies with two different model systems, which include embryonic zebrafish and planaria. In a high school setting, the use of zebrafish was problematic, as breeding did not occur with regularity, which led to the unstructured and inconsistent scheduling of research activities. Furthermore, immunohistochemistry techniques in non-embryonic zebrafish were not readily adaptable for a high school setting, nor is was it cost effective. Over the past year, we have implemented the use

of planaria as our model organism. Obtaining planaria and maintaining planaria is simple, as they regenerate quickly, and is time effective. Planaria of all ages can be immunostained using whole mount techniques, which is easier for younger students to perform. Furthermore, we have worked to develop simple and highly reproducible behavioral assays in planaria for locomotor activity, learning, and social behavior. Over the past three years of implementation of this program, 15 students completed projects that were sent and accepted by the Preliminary Round of the New York City Science and Engineering Fair (NYCSEF) using zebrafish over the course of two years. In year three, when our planarian model was implemented, we had a total of 20 students who qualified and presented at the Preliminary round of NYCSEF, with five of the students advancing to the New York City Finals Round. With the use of an appropriate research organism, modest research funding, skill-level appropriate laboratory techniques, and guidance of trained scientists, implementation of a research program in most schools is a feasible endeavor for most K-12 schools.

Disclosures: L. Thompson: None. **N. Ferraro:** None. **M.P. Reilly:** None. **S.R. Guariglia:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.09SA/JJJ55

Topic: J.02. Teaching of Neuroscience

Title: Teaching neuroscience through data-driven exploratory research projects in Chinese high schools and early college years

Author: *A. H. ASSADI[1], K. SUN[2]
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Abstract: Objective
To investigate effective methods to adapt sustainable education of neuroscience in Chinese high schools/early college years, as a source for future generations of neuroscience researchers.
Significance
Technological and scientific advances in China offers great opportunities for global improvement of human conditions. Providing mental health care at large scales require solution to challenging problems in education of neuroscience among other subjects. To initiate a healthy and productive dialogue to serve education-Science policy researchers and decision-makers, it would be essential to investigate different strategies for teaching neuroscience and following up the outcomes in terms of attracting students to neuroscience PhD/MD and post-doctoral programs.
Methods

We are developing syllabi for neuroscience [presently: functional brain anatomy, neurobiology, sensory-perceptual processes focus on vision, and cognition]. Selections from data science syllabi are coupled in parallel for exploratory investigation. Both threads are organized in terms of fundamental neurocomputational principles. Consideration of Chinese K-12 education reveals the need for emphasis on training students to formulate questions and discover ways to arrive at scientific research problems/hypotheses. Students are selected from senior year of high schools as well as undergraduates. In exploratory phase, lectures are in English, students are proficient in English with mathematics background including calculus. From cohort of students, half expressed interest in neuroscience, and others in diverse topics such as climate, cancer epidemiology, marketing and computational mathematics. All students had a combination of lectures, hands-on computation via MATLAB, short videos [YouTube, credit: Harvard/MIT] and modeling, which spanned 60 hours, plus students own extra time. The 2017 projects were from visual development, face recognition, color perception and autism. The students reported weekly progress to their teaching assistants, and prepared a final project report, which they presented in 15 min power points.

Results

The projects were completed by all students. Four students continued their projects and research training and learned to contribute to preparation and submission of conference papers, which reported research objectives, plans, methods and preliminary progress. The papers were co-authored by grad/undergrad students and research assistants in the group and were accepted in the CSCI 2017.

Conclusion

The 2017 results were encouraging, continuing in 2018 with forthcoming data for SfN 2018.

Disclosures: A.H. Assadi: None. **K. Sun:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.10SA/JJJ56

Topic: J.02. Teaching of Neuroscience

Support: Improving Teacher Quality State Grant

Title: Physiology laboratory experiences for applied science education (PLEASE): Engaging African American males in science education

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[1]Sch. of Biol. Sci., [2]Ctr. for Educ. Integrating Math, Sci. and Computing, Georgia Inst. of Technol., Atlanta, GA; [3]Applied Physiol., Georgia Tech., Atlanta, GA

Abstract: The use of inquiry-based learning has been shown to improve critical thinking, data analysis skills and self-efficacy in problem-solving. Educators from Georgia Tech teamed up with teachers from Fulton Leadership Academy (FLA), an all-male African American secondary school in Atlanta, GA, over the past year to provide inquiry-based professional development grounded in neuroscientific concepts. Teachers participating included science, math, special education and ELA teachers. Teachers first engaged in a week-long immersive summer professional development to experience inquiry-based learning for data collection. Equipment utilized includes BackYard Brains SpikerBoxes and Vernier ECG sensors, accelerometers and hand dynamometers. Through the experiential learning, teachers were provided with opportunities to collectively brainstorm how to utilize the data collection methods within their classrooms independently and collaboratively. Exemplar experiments included using SpikerBox cockroach and human data to better understand sensory and muscle physiology in a biology class or to better understand linear regression and lines-of-best-fit in an algebra class. The Vernier equipment was utilized for data collection regarding the knee-jerk reflex, assessing factors influencing the magnitude and latency, along with cardiovascular and muscle-fatigue focused inquiry-based activities. Discussions also included how methods might be utilized to differentiate instruction in team-taught classes and for English as a second language students. In addition to the summer workshop, teachers were provided three additional professional development workshops over the course of the school year to address integrated content lesson planning, assessing understanding, the value of active learning and reality pedagogy. Assessments for effectiveness included observations, student scores and self-reflections regarding changes to teaching practices.

Disclosures: R. Lawson: None. **L.A. Wheaton:** None. **T. Pearson:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.11SA/JJJ57

Topic: J.02. Teaching of Neuroscience

Support: SfN Chapter Grant

Title: Evidence-based neuroscientific public engagement: Brain Awareness Week at UCLA

Author: *T. J. WISHARD[1], V. SARAVANAPANDIAN[2], Z. M. AGHAJAN[3], A. IZQUIERDO[4], W. GE[5], M. CILLUFFO[6], R. ROMERO[6], N. A. SUTHANA[7]
[1]Ctr. for Cognitive Neurosci., [2]Neurosci., [3]Dept. of Psychiatry and Biobehavioral Sci., [4]Dept. of Psychology, [5]Dept. of Psychiatry & Behavioral Sci., [6]Brain Res. Inst., [7]Neurosurg. / Psychiatry / Psychology, UCLA, Los Angeles, CA

Abstract: On March 12-16, 2018, over 300 students from underserved primary and secondary schools across the Los Angeles area visited the Brain Research Institute (BRI) at UCLA. They participated in full-day events that were aimed at increasing public awareness of the progress and benefits of brain research and inspiring interest in higher education and STEM (Science, Technology, Engineering and Mathematics) careers. In the morning, students were introduced to the nervous system aided by hands-on demonstrations including the use of human and animal brains. Then, students participated in interactive presentations on topics relevant to the students' own lives during modules designed by undergraduate Neuroscience majors and developed with the guidance of Neuroscience doctoral students and faculty. These topics included *Facial Recognition, Emotions & the Brain, Amnesia in Movies, When Circadian Clocks Go Wrong, How Our Brains Help Us Move, Paying Attention, and Empathy & Mirror Neurons.* After lunch, students toured UCLA research laboratories as well as the BRI Microscopic Techniques and Electron Microscopy Cores. Interaxon, an undergraduate-run outreach group, incorporated activities into brief lessons to foster understanding of *Neuromarketing* and *Sports-related Brain Health*. Mid-afternoon, high school students met with a panel of faculty members and graduate (PhD and MD/PhD) students from STEM fields to share personal narratives, discuss college applications, and learn about different career opportunities available within the sciences. We collected pre- and post-evaluations to assess the effectiveness of our program at communicating neuroscience to primary and secondary school-aged audiences. The surveys evaluated student interest and enjoyment in learning about science and the brain, desire to attend college, and belief in the importance of science, as well as fundamental neuroscientific principles including understanding of the neuron, the synapse, and cerebral anatomy. Primary school students showed statistically significant increases in their understanding of fundamental neuroscience (including knowledge of the neuron, frontal, partial, occipital and temporal cortical lobes, and cerebellum) while secondary school students showed positive attitudinal shifts with increased enjoyment in learning about science and the brain following their visit to the BRI. Overall, our UCLA BAW 2018 program was successful in promoting interest in neuroscientific research and aims to continue to encourage the next-generation of curious thinkers and future scientists.

Disclosures: T.J. Wishard: None. **V. Saravanapandian:** None. **Z. M. Aghajan:** None. **A. Izquierdo:** None. **W. Ge:** None. **M. Cilluffo:** None. **R. Romero:** None. **N.A. Suthana:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.12SA/JJJ58

Topic: J.02. Teaching of Neuroscience

Title: Using neurotechnology and novel sensory-focused demonstrations to stimulate interest in science and the brain

Author: *W. E. BABIEC[1], T. J. WISHARD[2], V. SARAVANAPANDIAN[3], Z. M. AGHAJAN[4], W. GE[5], M. LEBRE[6], R. ROMERO[7], N. A. SUTHANA[8]
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Abstract: Project Brainstorm, a graduate student-run outreach program supported by the Undergraduate Interdepartmental Program for Neuroscience and the Brain Research Institute at the University of California, Los Angeles aims to inspire the interest K-12 students of low-income schools within the greater Los Angeles area in neuroscience and more broadly scientific education. The program takes undergraduate Neuroscience students to local K-12 school classrooms to educate students on the importance and functions of the human brain and increases opportunities for underserved communities to interact with college students and scientists. Our goal to foster interest in science is intended to increase the likelihood that students ultimately consider a college degree in STEM (Science, Technology, Engineering and Mathematics). Thus, neuroscience-focused lesson plans are tailored in order to facilitate student engagement and ranged from *Microscopes & Motor Neurons, Optical Illusions,* and *Music & My Ears* for primary school students to *Social Media & Facial Recognition, The Miracle of Taste* and *Clinical Neurotechnology* for high school students. Pre-visit evaluations showed that the majority of primary and secondary school-aged students had some basic understanding of the nervous system (e.g., concepts such as neurons and synapses). However, their knowledge of higher-level processes, such as correctly assigning sensory and motor functions to the four main cortical lobes and cerebellum, was low. We built upon students' previous knowledge by implementing novel demonstrations: electrophysiological devices to record brain activity and stimulate muscle tissue; portable microscopes to elucidate the unseen world; augmented-reality facial recognition software to virtually catalog community participation on popular social media applications. Comparisons of pre- and post-visit evaluations showed statistically significant improvements in the majority of the questions that were used to evaluate students' understanding of basic neuroscientific principles. Additionally, we evaluated student interest in learning about science and the brain, their desire to attend college, and their belief in the importance of science. Overall, the visits received positive feedback ratings from both age groups using a 5-point likert satisfaction scale. Importantly, student testimonials highlighted the hands-on activities as significant features of the outreach.

Disclosures: W.E. Babiec: None. **T.J. Wishard:** None. **V. Saravanapandian:** None. **Z. M. Aghajan:** None. **W. Ge:** None. **M. Lebre:** None. **R. Romero:** None. **N.A. Suthana:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.13SA/JJJ59

Topic: J.03. Public Awareness of Neuroscience

Support: UBC Faculty of Medicine Graduate Student Initiative Fund

Title: Neurohistory cartoons: A scientific outreach project combining the history of neuroscience and cartoon imagery

Author: *S. L. BAGLOT, N. GRADUATE STUDENT ASSOCIATION, A. MORTAZAVI, L. BOLANOS, A. R. GOBINATH
Neurosci., Univ. of British Columbia, Vancouver, BC, Canada

Abstract: The Neuroscience Graduate Student Association at the University of British Columbia in Vancouver, Canada has formulated a website that contains an online interactive timeline of the history of neuroscience. This project aims to present the history of neuroscience in an interesting and accessible manner - through the wonderful world of cartoon imagery. Groups of graduate students have been involved in summarizing the key findings and methodological advancements of historical scientists and events. These students gather information and formulate a cartoon mock up including figure captions. This information is provided to collaborating science cartoonists and the final products are made publicly available through an online interactive timeline. The website is a work in progress and can be found at www.historyofneuroscience.com and on twitter at **@neurohistoons**. The website currently contains cartoons for 8 historical neuroscientists or events, with many others being researched and designed. The website has approximately 105 unique visitors per week and the project's twitter has accumulated roughly 29 thousand impressions and one thousand engagements on 17 posts. The overall aims of the project are to: 1) provide an avenue for graduate students to explore the rich past of neuroscience research, which has laid the foundation for current research; 2) encourage graduate students to become better equipped at digesting the findings and significance of neuroscience publications; 3) provide an avenue for accurate neuroscience information to reach a broader audience by making the history of neuroscience publicly available, visual interesting, and easy to understand; and 4) instill an interest in and desire to pursue science research in younger individuals. This project is funded by the UBC Faculty of Medicine's Graduate Student Initiative and won the CAN 2018 Advocacy and Outreach Award.

Disclosures: S.L. Baglot: None. **N. Graduate Student Association:** None. **A. Mortazavi:** None. **L. Bolanos:** None. **A.R. Gobinath:** None.

Theme J Poster

022. Teaching of Neuroscience: K-12

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 022.14SA/JJJ60

Topic: J.02. Teaching of Neuroscience

Title: The 2018 world brain bee championship

Author: *J. D. GREENSPAN[1], M. PETRULYTE[2], N. R. MYSLINSKI[3]
[1]Dept Neural and Pain Sci., Univ. Maryland Dent. Sch., Baltimore, MD; [2]Univ. of Aberdeen, Aberdeen, United Kingdom; [3]Neural and Pain Sciences, 8th floor, Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: Future neuroscientists from around the world met in Berlin, Germany, to compete in the 20th Anniversary Championship of the International Brain Bee (IBB) founded by **Norbert Myslinski.** The IBB is the preeminent neuroscience competition for teenage students. The event was hosted by the **Federation of European Neuroscience Societies** in July, 2018. Worldwide there are about 150 chapter competitions, each one involving many schools. The Chapter

winners then compete in their respective Regional Championships to earn the right to compete in the World Championship. They are tested on their knowledge of the human brain with oral and written tests, a neuroanatomy exam using human brains, a patient diagnosis component, and a neurohistology exam. The regions competing were not known at press time, but the regions that sent their champions to the IBB Championship last year (2017) (and their coordinators) **were Australia (Ramesh Rajan), Brazil (Alfred Sholl-Franco), Canada (Judy Shedden), China (Jiangjie Yu), Egypt (Nardene Saad), Germany (Ina Simeonova), Grenada (Gail Blackette), 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), Nepal (Sarun Koirala), New Zealand (Maurice Curtis), Nigeria (Polycarp Nwoha), Poland (Elzbieta Malgorzata Pyza), Romania (Cristian Gurzu), Singapore (S Thameen Dheen), Ukraine (Andril Cherninskyi), United Arab Emirates (Sathy Parvathy), and United States (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**. The IBB's purpose is to motivate young men and women to learn about the human brain, and to inspire them to enter careers in the basic and clinical brain sciences. **Dr. N. Myslinski** founded the IBB in 1998 with 12 local chapters in North America. An estimated 20,000 students compete annually. More than 100 newspapers, radio and television stations cover the IBB and the student competitors at each stage of the competition, and about 50 web sites are devoted to the Brain Bee. Presidents, Ambassadors and other public officials have recognized the IBB. Many former competitors are now working in neuroscience, neurology, psychology and related fields. The Brain Bee is building better brains to fight brain disorders.

Disclosures: J.D. Greenspan: None. **M. Petrulyte:** None. **N.R. Myslinski:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.01SA/JJJ61

Topic: J.02. Teaching of Neuroscience

Title: The neuroscience of consciousness, free will, and moral responsibility: A undergraduate seminar integrating neuroscience, philosophy, and religion

Author: *S. MALLERY
Psychology and Neurosci., La Sierra Univ., Riverside, CA

Abstract: La Sierra University, a primarily undergraduate institution, places a strong emphasis on interdisciplinary thinking and the development of students' ability to consider problems from multiple perspectives. Consistent with this mission, as we were preparing to launch an undergraduate major in neuroscience, one of the early courses I developed to stoke student interest was an upper division seminar focused on the neuroscience of consciousness, free will, and moral responsibility. This course was designed to be accessible to students in psychology, neuroscience, and the humanities, with the hope that the inclusion of students from different backgrounds would enrich the conversations in class. I incorporated accessible neuroscience research and philosophical writings on these topics as well as discussion of religious and moral implications of the findings, theories, and models presented. The course began with rigorous discussion of epistemology and assumptions and limitations of various approaches to knowledge. Students described this as particularly helpful as they moved into examining ideas and evidence from various disciplines, and I found that this introduction was essential to moving students into consciously understanding their own methodological and disciplinary biases about the nature and value of various types of evidence. This introductory topic also created openness in students to alternate ways of knowing. The bulk of the course consisted of background reading and brief lectures coupled with seminar-style discussion of the implications of the models and research results presented in class. Students took turns leading discussions on the assigned readings and presented new material from articles assigned only to that student. Student learning was assessed via reading analyses, quality of discussion, a midterm exam, and a research paper and presentation of their work to peers. A reading list and syllabus for the course will be provided, along with comments on the readings that worked well for this population and some that proved difficult for non-science students to comprehend and discuss. One of the lessons learned was the importance of gaining buy-in and potential cross-listing from departments whose students could benefit from the class. Additionally, issues of disciplinarity and interdisciplinarity became important as questions arose about where and how this course should be housed and what requirements it could meet. These issues are discussed along with conclusions about how to improve the course in the future.

Disclosures: S. Mallery: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.02SA/JJJ62

Topic: J.02. Teaching of Neuroscience

Support: UCLA OID IIP #17-13
UCLA Division of Life Sciences
UCLA Division of Physical Sciences

UCLA Department of Physics and Astronomy

Title: Neurophysiological measurement, analysis and sense-making in college introductory physics for life sciences laboratories

Author: *E. MILLS, C. KITTUR, S. MENDOZA, C. DAO, K. ARISAKA
UCLA, Los Angeles, CA

Abstract: Across the country, undergraduate colleges and universities are revamping their physics for life science curricula to better meet student needs for improved content gains, enhanced physics attitudes, and increased abilities to apply physics concepts in life science, medical, and real world experiences. In the Physics and Astronomy Department at UCLA, we have revised our three-quarter Physics for Life Sciences Series with a new life-focused textbook, human-centered laboratories, and a cohesive structure between faculty, teaching assistants and undergraduate learning assistants to connect content across lectures, discussions, and labs. Specifically, we highlight recent developments toward increased human applications in our physics electricity and magnetism laboratories, where students use Arduino circuit boards, electrodes, and open source software to measure, analyze, and make sense of ECG, EMG, and EEG recordings using their own physiology. After a brief background on our human-centered treatment of electric fields, voltages and circuits, we provide examples of our experimental setup, activity instruction, and student feedback. Lastly, we offer insight into future steps of laboratory curriculum development from assessment data and technology innovations.

Disclosures: E. Mills: None. **C. Kittur:** None. **S. Mendoza:** None. **C. Dao:** None. **K. Arisaka:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.03SA/JJJ63

Topic: J.02. Teaching of Neuroscience

Support: UCLA OID IIP #17-13
UCLA Division of Life Sciences
UCLA Physics and Astronomy
UCLA Division of Physical Sciences

Title: Low cost eye tracking systems for use in teaching in undergraduate physics and neuroscience classes

Author: *S. MENDOZA, J. NGUYGEN, E. MILLS, K. ARISAKA
Physics, UCLA, Los Angeles, CA

Abstract: Microsaccades are small eye movements made during fixation to a stationary object. In order to measure the speed and duration of these movements it is necessary to have a system with high spatial and temporal resolution. However, these systems are often quite expensive and could be difficult to use. We propose a transparent and open source solution to eye tracking that will be useful to students in neuroscience and physics in studying human behavior and learning about programming and data analysis respectively. We have developed a relatively inexpensive setup that would cost less than 1000 dollars in total equipment to be used in undergraduate education. Our system uses a 550 frames per second 0.3 megapixel CMOS camera with a configurable region of interest to have a high speed coupled with a zoom lens to adjust to the appropriate magnification. We are able to achieve a 0.02 degree precision and 0.1 degree accuracy in our setup. In addition, we also propose other eye trackers that are cheaper but have lower frame rates that could be used for other types of studies such as gaze information. These other eye trackers include desktop mounted systems such as the Tobii eye tracker and Virtual reality headsets such as the FOVE and HTCVive. These other eye trackers can also be used in conjunction with virtual reality, allowing students to develop other kinds of studies, particularly those with a large field of view such as peripheral vision studies. These different kinds of eye trackers can be used to do different experiments each with their own advantages.

Disclosures: S. Mendoza: None. **J. Nguygen:** None. **E. Mills:** None. **K. Arisaka:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.04SA/JJJ64

Topic: J.02. Teaching of Neuroscience

Support: NSF Award #1649717

Title: Broadening participation in STEM using a novel research intervention tool

Author: J. WILLIAMS[1], *F. JEFFERSON[2]
[1]Biol., [2]Fort Valley State Univ., Fort Valley, GA

Abstract: Fort Valley State University's Neuroscience, Biology, Engineering, and Sleep (NeuBEs) Lab is currently funded to conduct research that seeks to establish initial connections (improvement of sleep quality and/or duration) to the outcome of interest (increase in number of underrepresented minority and women college students majoring in STEM fields (particularly noted "brilliance" fields of bio-/biomedical/neural engineering) or entering STEM careers). In college students, research has shown that variable sleep schedules, going to bed thirsty, environmental noise, and worrying while falling asleep contribute to poor sleep quality. Research has also demonstrated that in college students knowledge of sleep hygiene is related to sleep

practices, which, in turn, is related to overall sleep quality. Participation in sleep education programs has been associated with significant improvements in children's and young adult sleep and academic performance. This project tests the ability of a sleep intervention to increase non-STEM majors' interest in STEM fields and engagement in a STEM course via improvement in overall sleep quality and/or duration.

Disclosures: J. Williams: None. **F. Jefferson:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.05SA/JJJ65

Topic: J.02. Teaching of Neuroscience

Support: UA TLEF Grant
UA Teaching Fellowship

Title: Neuromembrane simulator for neuroscience students

Author: *D. W. ALI[1], G. D. FUNK[3], K. E. JONES[2]
[2]Fac Physical Educ. & Rec., [1]Univ. Alberta, Edmonton, AB, Canada; [3]Physiol., 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

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.06SA/JJJ66

Topic: J.02. Teaching of Neuroscience

Support: James Madison University Department of Biology

Title: Backward design of a primary literature-based lecture and laboratory course in developmental neurobiology for undergraduate biology majors

Author: *G. S. VIDAL
Biol., James Madison Univ., Harrisonburg, VA

Abstract: A new course entitled “Developmental Neurobiology” was taught at James Madison University as a 400-level biology elective course with a compulsory laboratory section. An overarching goal for undergraduate STEM education is to provide students with a solid foundation in scientific literacy, including analyzing primary literature, distinguishing causation and correlation, communicating science to audiences with varied scientific backgrounds, and understanding the social structures involved in the conception, production, and dissemination of scientific data. Thus, the selection of content for this developmental neurobiology course stemmed from a desire to improve student outcomes in these forms of scientific literacy and communication. The course was open to all undergraduates 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 field of developmental neurobiology and by the course design principle of “backward design”. As a result, most classroom time was devoted to in-depth discussion of primary literature, and laboratory exercises and assignments enhanced the understanding of discussed literature. Students became responsible for communicating the rationale, design, results, and relevance of landmark and recently-published literature in developmental

neurobiology. Results show that students gained significant skills in scientific analysis and communication, and improved attitudes and confidence toward scientific primary literature.

Disclosures: G.S. Vidal: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.07SA/JJJ67

Topic: J.02. Teaching of Neuroscience

Support: CSU CVMBS College Research Council Award
CSU Provost Office Program Review Award for Education/Engagement,
OEDIT Award, State of Colorado

Title: Providing research experience through a course that mimics a laboratory research environment

Author: *L. M. STONE-ROY
Fort Collins, CO

Abstract: Experiential learning is critical for undergraduate students to enhance learning, gain experience and help provide information about whether a specific career path is a good fit. For students interested in research, there can be obstacles to acquiring this type of hands-on experience. Supervising undergraduate students can be a burden on research faculty and there is often a lack of available positions. In addition, some students are hesitant to reach out and request this type of experience. To address these issues, we developed a course called Research in Biomedical Sciences that is designed to give students the opportunity to experience what it's like to work in a research laboratory. Individual sections of the course are run by faculty who take small projects or specific questions from their own research for student projects. Each section has about 10 undergraduate students who work both independently, and together to develop and test protocols, gather and analyze data, and compile, interpret and present data to other students and to faculty. The projects are open-ended similar to a real research lab, and students get to be part of the process of making new discoveries as well as facing unexpected outcomes and the possibility of shifting the focus or direction of a particular study. In addition to these experiences, students get research training, are able to work closely with faculty members, and can experience research without committing to a lab. At the end of the semester, students create and present a poster which is presented to the faculty member and which may be presented at a CSU or regional neuroscience meeting after completion of the course. This provides the opportunity to enhance a student's resume or CV in addition to providing them with experience communicating their research to an audience. To date, we've had over 50 students take the

course and course surveys and student comments indicate that students find the course a valuable experience. Faculty involved in the course have also benefitted in terms of generation of data and the ability to test pilot projects for their home laboratories.

Disclosures: L.M. Stone-Roy: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.08SA/JJJ68

Topic: J.02. Teaching of Neuroscience

Title: Integrated Science Experience: An interdisciplinary drug discovery laboratory-based course combining cellular and molecular neuroscience with organic chemistry

Author: *B. DIBENEDICTIS[1], A. YOUNG[2], D. SHEEHY[2], L. PASTORINO[3], J. K. SNYDER[2]
[1]Biol. Dept., [2]Chem., [3]Undergraduate Program in Neurosci., Boston Univ., Boston, MA

Abstract: Interdisciplinary approaches in higher education are gaining traction in pedagogical circles for their proven ability to enrich students' educational experience. This enrichment is achieved in part through encouraging students to broaden their perspectives, and by providing better direction in the way students learn to blend material across disciplines. We have developed a laboratory-based course mimicking the drug discovery process wherein undergraduate students derive hypotheses about possible therapeutic and diagnostic treatments for Alzheimer's disease (AD) and test their hypotheses in the laboratory using a hypothesis-driven learning model. In the organic chemistry laboratory portion of the course, students begin by isolating curcumin from turmeric, and subsequently learn several organic reactions (aldol, hydrogenation, acylation, diazole formation) through the synthesis of analogs that probe specific structural features of curcumin that could be responsible for its known therapeutic and/or diagnostic effects in the treatment of AD. In the cellular and molecular neuroscience laboratory, students then test the biological activity of their newly synthesized compounds using bioassays relevant to AD. In detail, students test the effects of their compounds on amyloid precursor protein (APP) processing and maturation (e.g. measuring mature to immature APP ratios) using Western Blot and immunoprecipitation techniques. Students further test the effects of their compounds on neuronal health and survival using immunohistochemical techniques in neuronal cell cultures treated with their isolated compounds. Finally, students also test the potential diagnostic properties of their compounds by staining APP transgenic mouse brain tissue with their dissolved compounds to determine whether they bind AD plaques, resulting in birefringence observed using fluorescent microscopy. Students also meet weekly in a "research group" setting with neuroscience and chemistry faculty to discuss their projects in the context of what is known

about curcumin in the treatment of AD. In addition to gaining hands-on experience in the laboratory, students also learn other valuable research skills including scientific literacy, data analysis, and generating testable hypotheses. Indeed, in addition to learning cross-discipline scientific skills, students enrolled in this course over the past two years have also achieved novel and in fact publishable results in the laboratory.

Disclosures: B. Dibenedictis: None. **A. Young:** None. **D. Sheehy:** None. **L. Pastorino:** None. **J.K. Snyder:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.09SA/JJJ69

Topic: J.02. Teaching of Neuroscience

Title: Supporting 21st-century learning skills in a neuroscience coursework

Author: *A. J. WINTINK[1,2]
[1]Ctr. For Applied Neurosci., Toronto, ON, Canada; [2]Psychology, Univ. of Guelph-Humber, Toronto, ON, Canada

Abstract: With the turn of the century, we have seen an explosion of information and new skills required to deal with learning in the 21st Century. These skills have been described in many ways but generally include: 1) *ways of thinking* (e.g., critical, creative, problem solving, innovation); 2) *ways of working* (e.g., collaboratively, process-based, through trial and error, self-directed, and experientially); 3) *ways of communicating* (e.g., formal writing, blogging, infographics, spatial, video, audio); 4) *digital and information literacy* (e.g., computer skills, technology, internet research); and *5) social responsibility* (e.g., citizenship & character development). These skills are proving themselves imperative to the lives of the 21st-Century student and citizen. These skills should be incorporated into the university classroom. This poster presents an overview of an assignment template used to teach Neuroscience in 3 Toronto universities. The assignment allows for students to engage in a variety of self-chosen topics and to develop a learning plan and a final product that is unique to their interests while also allowing the assessment to be consistent across students despite significant variation in methods of communication and design. For example, one student might submit a final product of a video whereas another student might submit a final product of a blog or twitter feed. The assessment involves an evaluation of process in addition to an evaluation of a final product.

Disclosures: A.J. Wintink: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.10SA/JJJ70

Topic: J.02. Teaching of Neuroscience

Title: The contribution of visual-spatial ability to student success in a large neurobiology course

Author: *A. C. NICHOLAS
Dept of Neurobio. & Behavior, Univ. of California At Irvine, Irvine, CA

Abstract: Innate visual spatial ability is considered a predictor of success in the biological sciences and other STEM fields. Often these tests show a strong gender effect, with males scoring significantly higher than females. However, gender effects have not been shown in tests of scientific literacy. To measure the contribution of visual spatial ability and scientific literacy to student success in were compared to student exam performance of incoming freshman across the Fall quarter in a large non-majors undergraduate coursecalled Drugs and the Brain. The course was taught using active learning techniques, including case study, games, data analysis, think pair share, in-class problem solving, drawing and graphing. All students were administered the Purdue Visualization Test, the TOSLS (Test of Scientific Literacy Skills) and the VARK Questionnaire of Preferred Learning Styles) in the lecture hall setting. Using a mixed-effects linear regression analysis, we observed a strong positive correlation between performance on the Purdue Visualization Test and the TOSLS. The TOSLS also showed a significant association with Reading and Kinetic learning style preference on the VARK questionnaire, but not Visual or Aural learning styles. Males scored higher than females and underrepresented minorities scored lower in general on the Purdue Visualization Test but surprisingly, no relationship between visual spatial ability and student preference learning style was shown. Student learning of course-specific content was assessed on two midterm exams and one final exam. The Multiple-choice component of these exams included diagrams and graph interpretation as well as case study application questions. Students were given questions for which they had to free hand draw and label a structure and process. The TOSLS, Purdue Visualization test and VARK questionnaire scores were then compared to student exam performance. No positive correlation was observed for visual spatial scores and learned course content, including content assessed by graph reading or diagramming. These findings, suggest that innate visual spatial ability is not always a predictor of success in STEM.

Disclosures: A.C. Nicholas: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.11SA/LLL1

Topic: J.02. Teaching of Neuroscience

Title: Use of circuit design challenges in an integrative introduction to neuroscience course

Author: *A. C. BASU[1], C. S. ROYDEN[2], J. R. BURDO[3]
[1]Psychology, [2]Mathematics and Computer Sci., Col. of the Holy Cross, Worcester, MA;
[3]NeuroTinker, Inc., Minneapolis, MN

Abstract: A major challenge in undergraduate science education is the fostering of integrative thinking, the ability to apply concepts and tools from multiple disciplines in the approach to complex problems (Project Kaleidoscope (PKAL) Report, AACU, 2011). A team of faculty from 5 departments (Biology, Chemistry, Mathematics and Computer Science, Physics, and Psychology) designed and first taught an integrative Introduction to Neuroscience course in 2016. In tandem with introducing principles of neuroscience, the main goal of this course is to raise student awareness of the importance of broad-based scientific proficiency in the study of complex problems. The course, targeted to first semester undergraduates who aspire to study science, makes use of inverted classroom and active learning pedagogy through 8 "flipped" classroom modules that cover basic STEM concepts, as previously described (Basu et al, *JUNE* 2017). Assessment of the first offering revealed gains in student interdisciplinary awareness in this course compared to two other introductory neuroscience courses at the same institution that have different pedagogical goals. In the second offering of this course three circuit design challenges were introduced in order to increase student awareness of the contributions of physics, mathematics, and computer science to principles of neuroscience. These 50-minute group activities made use of prototype NeuroBytes Electronic Neuron Simulators (provided by NeuroTinker, LLC). In each challenge, students were presented with neuron simulators and asked to create a circuit that produced a specific type of response to stimuli. The first challenge was a simple motor reflex, the second challenge was a center-surround receptive field, and the third challenge was a Hebbian learning circuit. With each challenge, students were asked to (i) diagram their circuits, (ii) list similarities and differences between their circuits and similar circuits that have been found in animals, and (iii) list conditions under which their circuits would fail to function as a comparable neural circuit in an animal. The challenges were designed to engage students in a problem-solving task, increase their understanding of how neural circuits function, and to demonstrate the strengths and limitations of using electronic models to study biological processes. Student responses to the open-ended prompt "What is Neuroscience?" (Crisp and Muir, *JUNE* 2012) administered at the beginning and the end of the semester revealed greater gains in the mention of physics, mathematics, and computer science compared to the previous iteration of the course.

Disclosures: A.C. Basu: None. **C.S. Royden:** None. **J.R. Burdo:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.12SA/LLL2

Topic: J.02. Teaching of Neuroscience

Support: SEA grant, Bowling Green State University

Title: Strategies for improving scientific and quantitative literacy in an undergraduate psychophysiology course

Author: *S. GARRETT-RUFFIN
Psychology, Bowling Green State Univ., Bowling Green, OH

Abstract: Students enrolled in an undergraduate psychophysiology course received educational interventions designed to increase positive attitudes toward science, improve quantitative literacy skills and experimental research skills. The educational interventions included re-design of previous labs and development of a new lab that involved analyzing electroencephalography (EEG) records from a publicly available EEG database. Furthermore, research project rubrics were redesigned to aid in student learning. Assessment of student outcomes involved using a quasi-experimental design with pre and post assessments to compare science attitudes and quantitative literacy between students in the psychophysiology class and comparison groups composed of students enrolled in two upper division laboratory courses in psychology. Science attitudes were assessed using the Student Science Attitudes Survey. While quantitative literacy was assessed using the Bowling Green State University (BGSU) Department of Psychology statistics assessment. The research projects produced in the psychophysiology class were compared to research projects developed by former students in the class. Assessment results indicated improved quantitative literacy skills for students in the psychophysiology course, as compared to students in the other laboratory courses. Although not statistically significant, the trend in the data indicated some positive change in attitudes toward science among students in the psychophysiology course, as compared to students in the other laboratory courses. Finally students in the psychophysiology course produced research projects that indicated deeper understanding of research methods as compared to research projects produced by previous students in the class.

Disclosures: S. Garrett-Ruffin: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.13SA/LLL3

Topic: J.02. Teaching of Neuroscience

Title: Using mTOR signaling as a tool for guided inquiry in an undergraduate molecular cell biology laboratory class

Author: *C. L. KUBERA
Monmouth Univ., West Long Branch, NJ

Abstract: Course-based undergraduate research experiences are becoming a useful way to provide more students with hands-on exposure to research. Our junior-level molecular and cell biology lab class was redesigned to provide a semester-long guided inquiry experience using a variety of techniques to answer a scientific question surrounding mechanistic target of rapamycin (mTOR) and its related signaling pathways. Among the course objectives were to (1) introduce fundamental laboratory techniques in molecular and cellular biology, (2) develop and encourage critical thinking skills through solving research problems and analyzing data obtained through experimentation, and (3) develop communication skills through written laboratory reports and oral presentation. The experimental setup was designed around hyperactivating mTOR, an atypical serine/threonine protein kinase involved in a wide variety of cellular pathways contributing to normal cell growth and development. Through transfection of a constitutively active Rheb DNA construct in neuroblastoma cells, students activated the mTOR signaling pathway and experimentally assessed what happened to the expression of another gene of their choosing in the mTOR signaling pathway. In the context and framework of mTOR and their gene of interest, students learned about cell transfection, PCR primer design, nucleic acid isolation, RT-qPCR, subcloning, DNA sequencing and immunochemistry. Understanding of the experimental process and data analysis and interpretation were assessed through creation of experiment flow charts and written lab reports interpreting whether gene expression increased, decreased or stayed the same when mTOR signaling was activated. Students demonstrated varying levels of comprehension, but all gained valuable exposure to the research process, including experimental design, execution and troubleshooting.

Disclosures: C.L. Kubera: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.14SA/LLL4

Topic: J.02. Teaching of Neuroscience

Title: Nu rho psi, the National Honor Society in Neuroscience

Author: *M. T. KERCHNER[1], S. K. DEBBURMAN[2], M. J. ZEE[3], M. J. GILL[4], *M. T. KERCHNER[1]
[1]Washington Col., Chestertown, MD; [2]Biol., Lake Forest Col., Lake Forest, IL; [3]Program Behavioral Neurosci, Northeastern Univ., Boston, MA; [4]Psychology Dept., North Central Col., Naperville, IL

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 70 chapters across the United States and over 5000 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 - 2018-19 *Glial Cells and Their Role in Health and Disease*. Members are also eligible for *Nu Rho Psi* travel grants to present their original research at the annual Society for Neuroscience meeting. Schools wishing to foster a chapter of *Nu Rho Psi* may contact the National Office located at Baldwin Wallace University (nurhopsi@bw.edu) and apply for a charter. For more information, see our web page: https://nurhopsi.org

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

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.15SA/LLL5

Topic: J.02. Teaching of Neuroscience

Support: CSUDH FRG RSCA 2017

Title: Sex-specific neurobiological differences in substance addiction: An educational pilot program for next generation STEM workforce

Author: *P. A. VIEIRA
CSU Dominguez Hills, Carson, CA

Abstract: California State University Dominguez Hills (CSUDH) is located in central Los Angeles county, servicing a diverse community. This region is considered a hotspot for drug abuse due to a variety of factors, including a close proximity with the Mexico border, an abundance of transportation facilities to support trafficking, and a substantial population of several at-risk groups. While graduates from CSUDH often go on to work in the community, these students do not yet receive the education in the factors leading to substance addiction. The aim of this program is to provide a set of courses which will train students on the latest addiction prevention and treatment research. The initial pilot course focused on sex-specific and neurobiological corollaries to drug dependence.
METHODS During the 2016-2018 academic years, 6 classes of senior undergraduate students were targeted for this program. Students worked individually and in small groups to prepare discussions on the neurobiology of addiction, following several original and secondary literature sources, The Addicted Brain (2011), peer-reviewed publications and published abstracts from SFN conferences from 2014-2017. Discussions with addiction researchers were also included. Students submitted research proposals to address potential gaps in the neuropharmacology literature, focusing on sex-specific studies. Survey data were collected before and after the course to assess learning outcomes and career trajectories for these next generation STEM workforce students.
RESULTS This pilot program has been well-received by the participating students. While it was clear that some students struggled with the content, all of them were personally engaged in the material. Indeed, many students openly shared their own experiences with drug dependence.
CONCLUSION Students need earlier exposure to the neurobiology of drug abuse to support their success in this course. We will therefore offer a psychopharmacology course to students prior to taking this course. The course was effective, however, at the primary learning outcome

of understanding the sex-specific differences in addiction. Given the diverse makeup of these courses, this program is a crucial intervention for increasing the diversity of the next-generation STEM workforce.

Disclosures: P.A. Vieira: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.16SA/LLL6

Topic: J.02. Teaching of Neuroscience

Title: Design and implementation of a multi-track neuroscience undergraduate degree

Author: *K. PHILLIPS, H. SONTHEIMER
Neurosci., Virginia Tech., Blacksburg, VA

Abstract: In 2015 Virginia Polytechnic Institute and State University (Virginia Tech/VT) began offering an undergraduate Bachelor of Science degree in Neuroscience (NS). The degree is housed in the School of Neuroscience, which currently has 17 primary and 82 affiliate faculty members. In just three years student enrollment grew by 286% to over 600 students. In contrast to typical graduate programs, the NS undergraduate degree was designed to cater to students with a broad range of interests and who wish to pursue employment in numerous industries where the understanding of brain and behavior is considered as asset. This includes careers in Business, Finance, Policy, Law, Education and Data Analytics, as well as the more traditional career paths in Research and Medicine. Accordingly our curriculum includes non-traditional courses such as NS of Law, Neuroeconomics, NS of Language, and NS & Society. We colloquially refer to the NS degree as the “new English major” implying that the degree offers the versatility once ascribed to a degree in English. To best guide students with such varied interests the School of Neuroscience developed 4 distinct majors within the degree: Experimental NS, Clinical NS, Cognitive & Behavioral NS and Computational & Systems NS. Over half of all students are pre-health students and enroll in the clinical NS major, with the second largest group (27%) enrolling in Cognitive and Behavioral NS. Surprisingly only a relatively small percentage matriculate into Experimental (8%) and Computation (7%) NS majors. Here we will present a detailed overview of the curricula and associated experiential learning and internship opportunities associated with each major.

Disclosures: K. Phillips: None. **H. Sontheimer:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.17SA/LLL7

Topic: J.02. Teaching of Neuroscience

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

Author: *H. G. MCFARLANE[1], R. J. BAYLINE[2], L. A. CHASE[3]
[1]Neurosci. and Psychology, Kenyon Col., Gambier, OH; [2]Washington and Jefferson Coll, Washington, PA; [3]Hope Col., Holland, MI

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 2017 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 most recent meeting this past summer at Dominican University. These workshops bring together educators to develop and share best teaching and laboratory practices. 6. FUN supports regional undergraduate neuroscience research symposia such as “MidBrains”, “SYNAPSE”, “NEURON”, and “mGluRs”. 7. FUN annually recognizes exceptional faculty accomplishments in neuroscience education, mentorship and service at the annual FUN Social. 8. Finally, FUN supports communication and networking among its members through our newsletter and listserve. FUN members and other interested in learning about FUN are encouraged to attend our annual business meeting and the FUN Social and Poster session, held during the SfN meeting. The time and location of these events will be listed on the poster. At the FUN Social, well over 120 undergraduate researchers and their mentors will present their work in a poster session (Sunday, November 4th at 6:45 pm). We will also honor the FUN Student travel award winners, recognize our generous sponsors, and honor faculty award winners.

Disclosures: H.G. McFarlane: None. **R.J. Bayline:** None. **L.A. Chase:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.18SA/LLL8

Topic: J.02. Teaching of Neuroscience

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

Author: B. R. JOHNSON[1], E. P. WIERTELAK[2], *R. L. RAMOS[3]
[1]Neurobio. and Behavior, Cornell Univ., Ithaca, NY; [2]Neurosci., Macalester Col., Saint Paul, MN; [3]Biomed. Sci., NYIT-COM, Old Westbury, NY

Abstract: The Journal of Undergraduate Neuroscience Education (JUNE) is a peer-reviewed, PubMed listed and open-access journal published by the Faculty for Undergraduate Neuroscience (FUN; www.funfaculty.org). JUNE presents articles addressing a wide range of topics focusing on undergraduate and graduate neuroscience education. These include course descriptions and their assessments by students, interviews with noted figures in neuroscience, laboratory exercises, outreach activities, and opinion pieces and editorial viewpoints on issues of general concern 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 curriculum and professional development, instructions for home production of inexpensive, high-quality and sophisticated lab equipment, a series of "amazing" papers in neuroscience, tutorial reviews, and the feature, "Case Studies", that gives a context to core neuroscience principles. For example, recent articles in JUNE include editorials and opinion pieces on topics like: FUN at 25 years, student-assisted course design, a student guide for attending the annual Society for Neuroscience meeting, and a discussion of engaged learning techniques using web-based, audience response systems. Recent full articles address a range of topics such as: a seminar course run by graduate students to teach experimental methods, the prominence of the neuroscience major for life science students, using social media to engage students and for public outreach, sophisticated simulation exercises addressing visual physiology, student-driven experiments with *C. elegans*, behavioral observations of fruit fly behavior, hands-on neural circuit construction with electronic simulators, and much more. JUNE seeks submissions in any of the above article formats. Go to www.funjournal.org for more details and free access to JUNE articles.

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

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.19SA/LLL9

Topic: J.02. Teaching of Neuroscience

Support: UC-HBCU award from the University of California Office of the President

Title: UCLA-HBCU Neuroscience Pathways Summer Program: A multi-institutional approach to leverage the excellence of students who are underrepresented in STEM fields

Author: *K. N. PAUL[1], A. IZQUIERDO[2], H. O. LAWAL[3], F. SCHWEIZER[2], G. POE[2]
[2]Brain Res. Inst., [1]UCLA, Los Angeles, CA; [3]Biol., Delaware State Univ., Dover, DE

Abstract: Attracting students from a diverse set of experiences and backgrounds is fundamental to creatively addressing the many challenges inherent in the study of the brain. However, hyper-competition in neuroscience careers, both at the Ph.D. and post-doctoral level, results in increased racial and ethnic disparities. African Americans, Hispanics, and Native Americans complete undergraduate STEM degrees at less than 5% nationally. There is evidence that this can be greatly mitigated with quality social support and mentoring. Here, we present details of a summer program aimed at developing long-lasting collaborations and year-round interactions with historically black colleges and universities (HBCUs). The goals of the program are to: 1) to increase the impact on students and faculty at HBCU partner institutions and the UCLA Brain Research Institute (BRI), and 2) to incentivize quality mentorship of the interns in our UCLA host labs. We have developed active research and teaching partnerships that accompany students before and beyond an 8-week internship at UCLA. To achieve a supportive network of mentorship in the lab, interns are mentored and trained by the faculty members who run the respective labs. Scientific mentors at respective HBCUs are actively involved in intern training and help coordinate training strategies during the summer internship. Interns also receive comprehensive mentorship from staff scientists, postdoctoral fellows and graduate students in the respective host labs. Additionally, we host one “chaperone” HBCU faculty member per year to accompany the student for the first week of the internship. Students who successfully complete the program and are admitted to the UCLA Neuroscience Interdepartmental Ph.D. program (NSIDP) are offered a scholarship that covers stipend and fees during their graduate work. If successful, the program will lead to the development of shared training modules and an increase in the enrollment and retention of HBCU students in Ph.D. programs.

Disclosures: A. Izquierdo: None. **H.O. Lawal:** None. **F. Schweizer:** None. **G. Poe:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.20SA/LLL10

Topic: J.02. Teaching of Neuroscience

Support: Howard Hughes Medical Institute
Lehigh University

Title: Transforming connections for success in STEM: The Lehigh university HHMI program

Author: *N. G. SIMON, V. C. WARE
Lehigh Univ., Bethlehem, PA

Abstract: Demand for a technologically advanced workforce can be met by addressing attrition from STEM majors. Our HHMI program intends to improve retention in neuroscience and other bioscience fields through curricular reforms, research engagement in teams, and enhanced mentoring. The program draws on prior HHMI-supported initiatives that expanded interdisciplinarity in life sciences curricula and research opportunities for undergraduates. These were: 1) Biosystems Dynamics Summer Institute: a 10-week summer research experience for undergraduates as members of interdisciplinary teams comprised of faculty, grad students, and post-doctoral investigators. To date, 50 teams (179 undergraduates, 88 grad students, and 85 faculty) have participated. More than 80% of undergraduate participants entered graduate programs or STEM fields, 2) SEA-PHAGES: a group of >140 institutions that study phages to identify diagnostic tools and therapeutics for tuberculosis. Of some 140 Lehigh SEA graduates, 85% are in STEM post-graduation, and 3) Curriculum Development: some 50 new or revised courses that are highly interdisciplinary and commonly feature course-based research experiences, including a publicly available introductory course. These programs are now institutionalized.
The current HHMI program focuses on retention and graduation rates among underrepresented groups and first generation students. It includes 1. BIOCONNECT: COMMUNITY COLLEGE (CC) COLLABORATIONS TO IMPROVE STEM RETENTION: provides Lehigh-sponsored undergraduate neuroscience and bioscience-related interdisciplinary research, mentoring, and STEM student community building experiences for CC students in preparation for graduation and/or transfer. We expect BIOCONNECT participants will show increased retention, advance to graduation, and transfer to universities at a higher rate; 2. RAPIDLY ACCELERATED RESEARCH EXPERIENCE (RARE): a pre-admission-to-graduation science immersion program that provides participants with outstanding scientific skills and preparation for leadership in addressing the complex issues facing the life sciences. RARE incorporates four dimensions seen as essential for success in underrepresented and/or first generation students: an innovative curriculum, identification in a community of scholars, addressing cultural issues that contribute to low success rates, and an understanding of the commitment required to excel in neuroscience and STEM. RARE tests if a comprehensive 4-year approach will improve retention in neuroscience and STEM to greater than 80% among participating students (our current STEM retention rate in these groups is 50%).

Disclosures: V.C. Ware: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.21SA/LLL11

Topic: J.02. Teaching of Neuroscience

Support: NSF DUE172493

Title: Integrating neuroscience into a new freshman research initiative at a regional comprehensive university: The Research Immersive Scholastic Experience in Biology program

Author: *R. E. COHEN, A. M. LAND[1], B. F. MARTENSEN[2], D. S. SHARLIN[1], B. A. SMITH[1]
[1]Biol. Sci., [2]Minnesota State Univ. Mankato, Mankato, MN

Abstract: The Department of Biological Sciences at Minnesota State University, Mankato, a primarily undergraduate institution, is developing and implementing the "Research Immersive Scholastic Experience in Biology" (RISEbio) program. RISEbio is a National Science Foundation-funded scholarship and support program that is targeting incoming Biological Sciences freshmen with demonstrated financial need and academic potential. The overall goal of RISEbio is to increase student academic success through: (1) Increasing student social integration and support, (2) developing student technical and professional skills, and (3) implementing a freshman immersive research program. To form a social support network, scholars will be part of a RISEbio learning community. A unique, core component of RISEbio is to provide scholars with an authentic real-world research experience by modifying freshman research initiatives utilized by research-intensive universities to fit within the available infrastructure at Minnesota State University, Mankato. During a scholar's first year, they exchange their Introductory Biology 1 lab for an applied course, Foundational Methods in Biology. In their second semester, scholars join a research stream in exchange for their Introductory Biology 2 lab. The stream research continues on to their third semester. One of two initial research streams is focused on neuroscience and is titled "Brain and Behavior." Students in this stream examine the neural control of reproductive behavior by examining gene expression in the brain of the seasonally breeding green anole lizard (*Anolis carolinensis)*. Students will extract RNA from the hypothalamus of breeding and non-breeding lizard brains, then design primers and use quantitative PCR in conjunction with bioinformatic analysis to identify genes that are differentially expressed in the brain between seasons. If differentially expressed genes are found, students will learn how to design and perform *in situ* hybridizations to examine the localization of these genes within the brain. Following the third semester, scholars enter the "next steps" stage which offers support to identify additional opportunities on and off campus, including mentoring the next group of RISEbio Scholars or joining research labs to continue

conducting undergraduate research. RISEbio will also provide a platform to test how this program translates to student persistence and academic success. To our knowledge, this is the first freshman research initiative developed at a regional comprehensive university.

Disclosures: R.E. Cohen: None. **A.M. Land:** None. **B.F. Martensen:** None. **D.S. Sharlin:** None. **B.A. Smith:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.22SA/LLL12

Topic: J.02. Teaching of Neuroscience

Title: Exploration of teaching social neuroscience in Mexican training programs in neuroscience

Author: *I. GONZALEZ RIVERA[1], R. DÍAZ-LOVING[2]
[1]Univ. Nacional Autónoma De México, Facultad, CDMX, Mexico; [2]Univ. Nacional Autónoma de México, Mexico City, Mexico

Abstract: The social behavior has been studied from different perspectives over time. Currently, the social aspect has been included as an important and specific part of the study of Neurosciences, called Social Neuroscience. There is evidence that shows that particular neural systems are dedicated to process social information. Also, techniques that incorporate the neurobiological aspect with the social behavior allows us to have more complete models that better explain human behavior, so it is important to include them in the training of neuroscientists. The present study aimed to explore the inclusion of the theory and technique of Social Neuroscience in Neuroscience training programs in Mexico City, as well as the perception of knowledge in this area in neuroscience students, and finally analyze the scientific production in this area worldwide. We made an analysis of three study programs in Neurosciences in Mexico City, selecting the contents that are related to Social Neuroscience. Subsequently, we ask students of Neuropsychology about their perception of knowledge of Social Neuroscience, and finally, we compared the number of results on Social Neuroscience in scientific databases with other fields of study of social behavior. The results indicate that there are some deficiencies in the knowledge of this field in Mexico City. Results also show that, despite the students don´t know a lot about this particular area, they have a solid knowledge about general aspects of Neuroscience. We discuss the necessity of teaching students about the possibility of combining multiple methodologies, which includes experiments on social behavior, computational models and experiments with magnetic resonance, to achieve a better understanding of any phenomenon of interest.

Disclosures: I. Gonzalez Rivera: None. **R. Díaz-Loving:** None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.23SA/LLL13

Topic: J.02. Teaching of Neuroscience

Title: Using scientific articles and peer review to promote neuroscience education

Author: *K. M. CROSBY
Biol., Mount Allison Univ., Sackville, NB, Canada

Abstract: As an Anatomy and Physiology professor at a small undergraduate university, I have the pleasure of teaching an advanced fourth year neurophysiology course. To promote learning, and enhance students' critical thinking, writing, and presentation skills, I stray from a lecture-based approach, and instead utilize a variety of tools and assignments focused on reading and writing scientific articles and the rigorous peer review process. I use a multi-faceted approach where students can act as authors, editors, and reviewers of scientific articles to enhance their understanding of concepts and techniques in neuroscience, while simultaneously building various skills that will benefit them beyond university. In my classroom, students act as authors by writing a scholarly review on a recently published journal article in a neuroscience field. Students are required to follow the *Journal of Neuroscience* Journal Club format for their submission, and are encouraged to submit their work for publication if their selection falls under the criteria specified by the journal. Students also act as authors in in-class assignments or exam questions in which they are given a journal article with a section omitted (for example: the abstract or introduction), and they are required to write that section. Students also have the opportunity to act as editors for a neuroscience journal. In this capacity, they review a new manuscript (often one that I am about to submit for publication that is relevant to the class). Students are required, in a designated short period of time, to read over the article, write a short summary of the important points, decide whether the article should be sent on for peer review or whether it should be rejected, and justify their decision. If they decide the article warrants peer review, students must identify experts in the field to serve as external reviewers. My students also have the opportunity to act as external reviewers by thoroughly reviewing an article (often one that has recently been published) and presenting a summary and a critical review to their classmates. They often perform this task working in groups and therefore can develop their ability to collaborate through this assignment. Overall, through the use of a variety of teaching and learning strategies aimed at reading, understanding, writing, and reviewing scientific articles, students in my neurophysiology class develop a broad but in depth understanding of several areas of neuroscience, while honing very important skills including critical thinking, writing and presentation skills.

Disclosures: K.M. Crosby: None.

Theme J Poster

023. Teaching of Neuroscience: College I

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 023.24SA/DP15/LLL14

Topic: J.02. Teaching of Neuroscience

Support: Stanford Vice Provost for Undergraduate Education

Title: A brain simulation environment for playful learning in cognitive neuroscience

Author: *D. BIRMAN, J. L. GARDNER
Psychology, Stanford Univ., Stanford, CA

Abstract: Cognitive neuroscience courses are missing a critical teaching component found in almost every undergraduate biology, physics, and chemistry class: interactive and playful lab experiences. Unlike most natural sciences it is difficult to reproduce classic experiments in cognitive neuroscience due to ethical and practical limitations: we can't have students experiment on live animal brains in the classroom. To bridge this gap many courses turn to demonstrations in which instructors show and explain techniques, sometimes live but often through videos, but students do not get to interact and test hypotheses about the brain directly. In our courses we have taken a different approach: we have developed an online brain simulation environment (http://brain.danbirman.com) which lets students conduct classic experiments in the lab which would otherwise require live electrical recording from animal brains.

In our simulation environment students start by placing electrodes into the visual cortex to investigate the functional organization of the visual hierarchy. For example, early on in the course we have students map the receptive fields of neurons, i.e. the region of visual cortex which a neuron is responsive to, by placing simple stimuli (circles, bars, moving dots) into a simulated visual field and exploring how neurons respond. After mapping the receptive fields of two or three neurons few students fail to grasp the conceptual idea of the receptive field. This approach mimics the way that these scientific discoveries were actually made in the laboratory as part of a process of trial and error. We find that students are far quicker to grasp the key concepts about receptive fields when presented as experiments and that students stay more engaged when they are in charge of their own learning.

Over the last two years we have successfully introduced many tutorials based on this simulated brain environment in a large undergraduate lecture course with over 200 students. Importantly, students who use the brain simulation environment have remarked on how it feels like they are "doing science" rather than memorizing facts. Moving cognitive neuroscience towards a process of experimenting and playful discovery will go a long way toward encouraging students to engage deeply with the concepts and phenomena of our field.

Disclosures: D. Birman: None. **J.L. Gardner:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.01SU/LLL15

Topic: J.02. Teaching of Neuroscience

Title: The impact of team-based learning on undergraduate neuroscience classroom dynamics and course learning objectives

Author: *T. NEWPHER[1], M. NG[2]
[1]Duke Inst. for Brain Sci., Duke Univ., Durham, NC; [2]Duke Inst. For Brain Sci., Durham, NC

Abstract: Background: Collaborative learning is an evidence-based instructional strategy that deepens student learning by facilitating rich classroom discussions between students. These cooperative activities are at the core of active learning, a pedagogical method where students learn by engaging with the material and each other. Importantly, active learning in undergraduate STEM classrooms has been shown to increase student learning gains and to decrease failure rates. Furthermore, these structured learning environments encourage student participation, increase motivation, and promote self-efficacy. Team-Based Learning (TBL) is a highly effective form of active learning in which students work in permanent teams and spend the majority of classroom time learning to apply course content, analyze data, and synthesize new ideas and hypotheses. While studies have shown that TBL improves learning outcomes and student course satisfaction, it remains unknown whether TBL improves student-perceived classroom dynamics and learning of higher order Bloom's course objectives in undergraduate STEM classrooms.
Purpose: Identify classroom dynamics and Bloom's learning objectives impacted by a TBL environment in introductory and advanced undergraduate neuroscience classrooms.
Experimental approach: Student course evaluations were obtained from four neuroscience courses: 1) lecture-based gateway; 2) team-based gateway; 3) lecture-based molecular neuroscience; and 4) team-based molecular neuroscience. A total of 15 measures of classroom dynamics and learning objectives were compared within the course type using a Mann Whitney test.
Results: Several measures of course dynamics and learning objectives were higher in classes that implemented team-based learning. Specifically, we observed significant increases in 1) gaining factual knowledge, 2) learning to synthesize and integrate knowledge, and 3) creating a well-structured and organized classroom.
Implications: Our results suggest that implementation of TBL in an undergraduate neuroscience classroom improves student-perceived learning in the knowledge and synthesis levels of

Bloom's taxonomy. These results are consistent with the strong emphasis placed on higher order learning objectives in a TBL classroom.

Disclosures: T. Newpher: None. **M. Ng:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.02SU/LLL16

Topic: J.02. Teaching of Neuroscience

Title: EEG 101: A practical, interactive, free & open source tool for use with low-cost mobile EEG in neuroscience education

Author: D. MORRISON[1], H. BANVILLE[1], T. MCNEELY[1], N. PROULX[2], *G. MOFFAT[2], G. KING[3]
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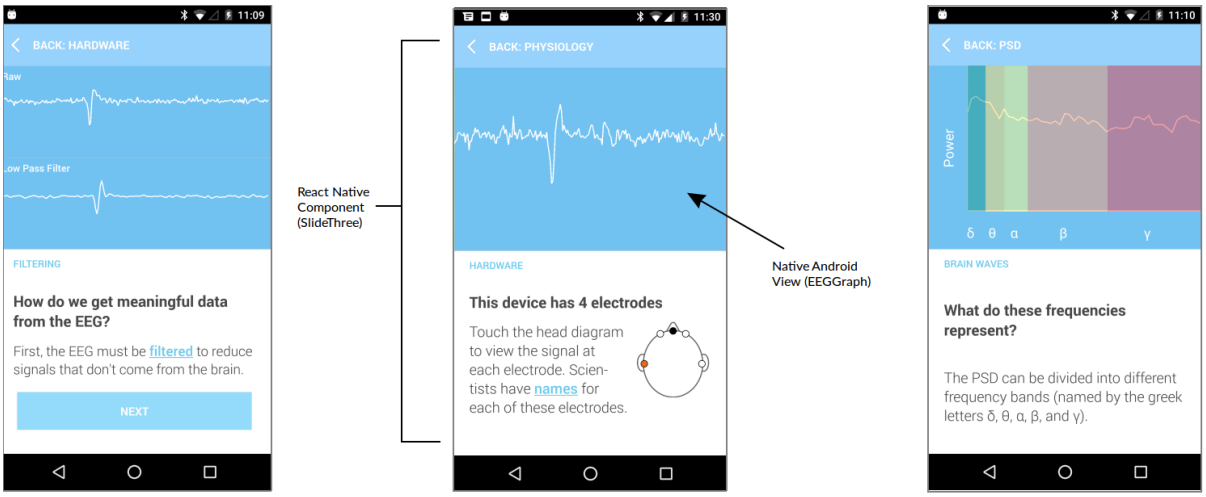
Abstract: EEG 101 is a free, interactive, open source mobile app developed by community members of NeuroTechX, an international network of neurotechnology enthusiasts. Available in multiple languages, it teaches basic concepts in human electrophysiology, EEG, evoked potentials, signal processing, and brain-computer interfaces (BCI) by providing a high level overview of physiology and data processing, through interactive treatment of real time EEG signals from a low-cost consumer wearable EEG system. Concepts including artifact detection, filtering, epochs, and fourier decomposition are illustrated using intuitive visual representations of live data.
The EEG 101 app has been used in undergraduate and high school neuroscience education around the world. The application has been downloaded more than 5,000 times on the Android Play Store and featured at open science workshops including Mozilla Festival 2017. Beyond its utility in introducing basic concepts in a novel, engaging manner, the open source code base is a valuable reference for code-aware students who wish to build their own EEG-based applications. This poster will include live demonstrations of EEG 101 on tablet and smartphone, as well as guidance for neuroscience educators who wish to test or deploy the application in their own classrooms or labs.



Disclosures: D. Morrison: None. **H. Banville:** A. Employment/Salary (full or part-time):; Interaxon. **T. McNeely:** A. Employment/Salary (full or part-time):; Interaxon. **N. Proulx:** A. Employment/Salary (full or part-time):; Interaxon Inc. **G. Moffat:** A. Employment/Salary (full or part-time):; Interaxon Inc. **G. King:** E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); KBD Group.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.03SU/LLL17

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant DUE-1044643

Title: A simple, inexpensive voltage-controlled current source system for neuroscience applications

Author: *I. VILINSKY, K. L. HIBBARD[1], B. R. JOHNSON[2]
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Abstract: Light stimulation, of visual systems and optogenetically activatable neurons, is an increasingly important component of undergraduate neurophysiology teaching laboratories. Visual systems are an excellent preparation to teach sensory physiology because of their multifaceted and analytically interesting response characteristics. Optogenetic control has recently emerged as a particularly powerful tool to activate, or suppress, specific genetically-targeted neurons. Both applications require high intensity light sources that can be precisely

controlled with respect to both timing and intensity. Currently available solutions tend to be expensive and complex, limiting broad application in a teaching setting. Alternatively, self- built systems require a degree of sophistication in electronics that may be beyond the scope of many educators. We here describe a simple, modular and inexpensive system that uses off- the- shelf components, requires little expertise, and can be assembled quickly. The main components of the system are a voltage controlled current supply that can easily be integrated into any standard analog/ digital data input-output system, and high intensity LED arrays that are available in broad spectrum or specific narrow-band configurations. To demonstrate the utility of our assembly we present student data from laboratory courses in which students observed synaptic transmission at the neuromuscular junction through optogenetic stimulation of motor neurons in *Drosophila* larvae. In addition, students have used this system to activate well-characterized behaviors triggered by genetically defined neural circuits in adult flies, for visual stimulation and electroretinogram recording in wild- type and mutant *Drosophila,* and to examine spectral sensitivity of the crayfish caudal photo receptor, an interneuron in the ventral nerve cord containing photoreceptive pigment. This simple and inexpensive voltage-controlled current source has broad applications, and we anticipate that it could become a widely used tool in neuroscience education.

Disclosures: I. Vilinsky: None. **K.L. Hibbard:** None. **B.R. Johnson:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.04SU/LLL18

Topic: J.02. Teaching of Neuroscience

Title: Developing a tool to assess the learning gains of a neuroscience curriculum

Author: *W. E. GRISHAM[1], W. E. BABIEC[2], H. WHANG[3], M. LEVIS-FITZGERALD[3], N. SCHOTTLER[1]
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Abstract: Concept Inventories (CIs) are education-related diagnostic tests that repeatedly measure **learning gains** by assessing students' performance as they progress through their studies. Therefore, a CI can be used to discern a students' longer-term retention of information in contrast to grades, which may reflect momentary "cramming" effects. We report here on the performance of a prototype CI for assessing learning gains across the entire undergraduate neuroscience curriculum at the University of California, Los Angeles. Specifically, the focus of this CI is to assess whether the program's goals and desired learning outcomes are being met by the current curriculum and didactic approach.The CI is a 31-item, 5-choice per question, test

covering neuroanatomy, neurophysiology, cognitive neuroscience, developmental neuroscience, molecular neuroscience, and neuropharmacology. The test is based on items from the Neuroscience Pre Test (Siegel & Siegel, 2002, McGraw-Hill), with some additions and modifications by UCLA faculty. (An IRB exemption was obtained for this work.) *Reliability*, assessed by measuring internal consistency, is an essential feature of a good assessment instrument. The initial CI (CI 1.0) showed admirable reliability with a Chronbach $\alpha = .720$. A second measure of test-instrument effectiveness is *validity*. If a test is valid, its scores should correlate with other measures that also purport to measure the same outcome. We found that CI 1.0 scores accurately ***predicted*** grades in our core neuroscience course series: NS101A ($r = 0.543$) and NS101B ($r = 0.415$), as well as the Senior Capstone laboratory course NS101L ($r = 0.332$) ($p < 0.005$ for each correlation coefficient). Further, an effective CI should yield scores commensurate with students' level of experience with the neuroscience curriculum. Indeed, seniors in our Capstone NS101L scored significantly better than first-year general students as well as seniors in the related Psychobiology major. Having established the utility of the CI in assessing students' accrual of neuroscience knowledge during their academic career, we aim to further refine the CI by doing a rigorous item analysis and by adding items to better assess successful student completion of UCLA Neuroscience's stated program goals and desired learning outcomes. Further, we will use this tool to test for differences in learning gains among the different demographic sectors of our program, including under-represented minorities.

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

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.05SU/LLL19

Topic: J.02. Teaching of Neuroscience

Title: Electronic devices in the classroom - Use it or lose it?

Author: *L. L. MCGREW
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Abstract: Electronic devices like smartphones, laptops and tablets are increasingly common - a 2017 Pew Survey reports that 92% of 18- to 29-year-olds own smartphones and over 70% own laptop computers. These devices can be great resources but they also represent significant sources of distraction. For this reason, some instructors enforce strict "no electronics" policies in their classrooms. Alternatively, these devices can be used to generate classroom interactions. Poll Everywhere, for example, is an easy way to survey the class for answers to a given question. Shared Google documents or slides allow real-time contributions to collaborative work. Add-ons

like Annotable allow students to take their notes directly on their eBooks. Textbook publishers and others have generated packages designed to provide students with opportunities to assess their understanding using a variety of learning formats. Finally, a number of applications have been created to record or analyze data: Backyard Brains has an oscilloscope app, Vernier has a graphical analysis app, Google Science Journal app allows integration of data, video and typed observations. Furthermore, embracing technology in the classroom provides the opportunity to teach students computer-based skills like evaluation of sources when gathering data for a paper or using Excel to analyze data and produce a graph. So rather than forbid the use of technology, find ways to use that technology to stimulate student interaction while improving computer competency.

Disclosures: L.L. McGrew: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.06SU/LLL20

Topic: J.02. Teaching of Neuroscience

Title: A neuronal membrane simulator as a complementary learning tool for medical students

Author: *M. FORSBERG[1], E. J. ERIKSSON[3], H. SETH[2], E. L. HANSE[4]
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Abstract: When teaching basic neurophysiology to medical students, the concepts that the students struggle with the most are the basic principles of electrochemistry, which lay the foundation for understanding the membrane potential and action potential. Previously, we have taught these concepts by traditional teaching methods such as lectures, and interactively in the form of seminars where the students discuss the topic with each other aided by a teacher. Despite this dual approach, many students leave the neurophysiology course without a real understanding of the principle mechanisms behind the generation of electrical potentials in neurons. Building on the graphical Hodgkin-Huxley simulator “HHsim”, developed by David S. Touretzky and colleagues, Carnegie Mellon University, Pittsburgh, we modified the software to simulate a mammalian neuronal membrane instead of the original giant squid axon. We also reworked the outdated graphical user interface and updated the code with the latest features of MATLAB®. The simulator is available to the students via the university’s online learning platform (Gothenburg University Learning Platform; GUL), along with exercises and questions designed to help the students explore the simulator and highlight the importance of the different parameters of the Hodgkin-Huxley model. After the students have gone through the exercises,

alone or in groups, as they prefer, they can watch a video where a teacher goes through the exercises and explain the correct answers to the questions as well as the limitations of the model. We have made this simulator available as an optional complementary learning tool for the medical students at our university and will evaluate the effectiveness and student satisfaction continually. As with every new tool, modifications will in all likelihood be needed after a test period. However, our hope is that this interactive tool will encourage deeper understanding of the complex mechanisms so fundamental to the field of neurophysiology.

Disclosures: M. Forsberg: None. **E.J. Eriksson:** None. **H. Seth:** None. **E.L. Hanse:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.07SU/LLL21

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant 1538505

Title: Understanding the role of diffusion in synaptic transmission through inquiry-based learning and quantitative reasoning

Author: *G. K. ZUPANC
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Abstract: The elucidation of the principal features of chemical synaptic transmission has been one of the great achievements in the history of neuroscience, yet students have significant difficulties developing a deeper understanding of the underlying concept. This is particularly true for the role that diffusion of neurotransmitters across the synaptic cleft plays in this process. At least part of the learning problem is due to the erroneous view of diffusion as a slow process, and the lack of comprehension of synaptic dimensions and proportions. To avoid, or overcome, these common misconceptions, a structured/guided inquiry activity, combined with quantitative reasoning tasks, is described for teaching chemical synaptic transmission as part of undergraduate biology or neuroscience courses. Through this activity, students familiarize themselves with the absolute and relative dimensions of the structural components of synapses; use data from morphometric and schematic models of synapses to estimate the time it takes a neurotransmitter to diffuse across the synaptic cleft; and evaluate how this process relates to synaptic delay and generation of sufficiently high concentration of transmitter for activating postsynaptic receptors.

Disclosures: G.K. Zupanc: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.08SU/LLL22

Topic: J.02. Teaching of Neuroscience

Title: Interactive models for optics education using eye tracking and an electronic retina

Author: *G. Q. BUTCHER, J. N. REITZ, R. ANDERSON, E. TORIGUE
Thiel Col., Greenville, PA

Abstract: Integration of legitimate experimentation and active learning into the undergraduate classroom setting improves student interest, retention of material, and learning outcomes. Here, we present two projects emphasizing different aspects of the visual system developed through a collaboration of Thiel College's departments of Computer Science, Neuroscience and Physics. These projects could be utilized as class build activities, in which students construct their own devices, as pre-constructed equipment that students use to test novel hypotheses, or some combination of both. Eye Tracker: The use of eye tracking at the undergraduate level can be limited due to the expense of the necessary equipment. However, this technique is widely used to assess visual cognitive processing impairments associated with many neurological disorders such as concussion, Alzheimer's disease, and schizophrenia. Additionally, eye tracking can be used in psychological studies to measure attention, arousal, and interest. In our first project, we developed a low-cost eye tracker, designed to teach students the basics of this methodology. Software for the eye tracker was created using Matlab. In a class setting, students could use the device to understand basic thresholding, measure phase lag by tracking the pupil, and develop novel experiments of their own. Through such experimentation, students would develop critical thinking skills and combine knowledge from multiple undergraduate classes including neuroscience, psychology, engineering, computer software, and physics. Electronic Retina: In a second project, we set out to develop an electronic retina to help students understand the eye at the cellular level. Our model retina uses an Arduino microcontroller to process information received from an array of light sensors and potentiometers, and then control an RGB LED matrix display. Users can activate the retina with any light source and use the potentiometer knobs to adjust variables used by the microcontroller. Additionally, the microcontroller can be programmed to imitate other concepts that are frequently taught in neuroscience classes including persistence, adaptation, various retinal diseases, and lateral inhibition. Our goal is to help students gain a better understanding of circuitry of the retina by physically interacting with a model and modifying various parameters.

Disclosures: G.Q. Butcher: None. **J.N. Reitz:** None. **R. Anderson:** None. **E. Torigue:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.10SU/LLL23

Topic: J.02. Teaching of Neuroscience

Title: Assessment of peer writing assignments significantly improves indicators of confidence in using the primary literature, in a cohort of Occupation Therapy students

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

Abstract: BIO202 is an undergraduate neuroanatomy/neurophysiology class taken exclusively by students in an occupational therapy program. These students generally have only a one year freshman-level anatomy and physiology course as a prerequisite, and are unfamiliar, and uncomfortable, with the primary literature in any scientific field. A term paper in that course offers their only chance in their curriculum to use primary scientific. To improve facility with the primary literature, one lab section (16 students) was given an anonymous copy of a first draft of the previous year's students and asked to grade it. As a control, another lab section (16 students) was given a published review paper and asked to critique it. By several measures of comfort using primary literature as a source (Pack, 2007), the group that graded peer papers did better on their own written first drafts in terms of larger number of proper citations used, and fewer number of improper quotations used.

Disclosures: A.K. Pack: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.11SU/LLL24

Topic: J.02. Teaching of Neuroscience

Title: Neuroscientists' perspectives on making neuroscience research and teaching more critical and ethical

Author: *P. W. TSANG[1,2], A. LAM[2,3], E. L. OHAYON[2,3]
[1]Leadership Higher and Adult Educ., Univ. of Toronto, Toronto, ON, Canada; [2]Green Neurosci. Lab., Inst. for Green and Open Sci. (IGOS), Toronto, ON, Canada; [3]Green Neurosci. Lab., Neurolinx Res. Inst., San Diego, CA

Abstract: This critical ethnographic and autoethnographic study sought neuroscience students', researchers' and educators' perspectives, on the issues, opportunities, and barriers faced in practicing a more critical and ethical neuroscience. This qualitative research took a critical theory approach to the production and control of knowledge, looking at participant experiences of the hegemonic discourse of neuroscience teaching and research at universities, and the ways participants challenged current mainstream approaches.
Research participants were recruited based on their neuroscience scholarship and expertise in sustainability, elimination of animal experimentation, community-based work, neurodiversity, and/or open science. Additional participants were recruited through snowball sampling. One-on-one interviews were conducted with a range of participants including: university faculty members, principal investigators at an independent research laboratory, and PhD students. Participants were asked to critically assess their educational experience for what they felt was missing from their own neuroscience education. Participants were asked about their motivations for, and examples of, their own critical and ethical neuroscience practice, and for examples of barriers they have faced in their neuroscience practice. Participants were also asked to provide documentary examples of their critical and ethical practices and of the barriers faced.
Interview transcripts and documents were analyzed and grouped into categories: student/teacher/curricular content, community, tools, formal/informal rule, motivation/influence, problematic, and barrier. Themes identified that impacted participants' experiences of neuroscience research and teaching include 1) the role of education (both formal and informal learning), 2) scientific culture (epistemologies; subjectivization of the student, faculty, research subject), and 3) marginalization (both direct and indirect exclusion). Participants described themselves as 'activist' and/or described the use of activist methods in promoting their 'message' of critical and ethical neuroscience practices - i.e., the use of social media, messaging/communication and engagement strategies, creating and connecting with existing local and transnational support networks, and culture-jamming.
The findings point to curricular content, and research and learning taking place outside the classroom as factors for cultural transmission of neuroscience practice. Future studies may look at the 'social movement' for transformation and generation of new forms of neuroscience practice and culture.

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

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.12SU/LLL25

Topic: J.02. Teaching of Neuroscience

Title: Curiouser and curiouser: Contextualizing neuroscience in the arts and humanities to teach brain-body relationships to engineers, architects, and computer scientists

Author: *A. A. WALF[1], T. HAHN[2]
[1]Cognitive Sci. Dept, [2]Arts Dept, Rensselaer Polytechnic Inst., Troy, NY

Abstract: How do we maintain curiosity for learning in our college students, especially those who find themselves in a neuroscience course outside their major to complete their elective requirements? One approach taken for students enrolled in neuroscience courses at Rensselaer Polytechnic Institute (Troy, NY) is a pedagogical initiative called Art_x ("Arts Across the Curriculum"). Art_x includes courses and other programming aimed at bridging concepts of the arts in STEM and STEM in the arts. Art_x has been instrumental in supporting novel approaches in neuroscience courses that typically have enrollments of students outside of neuroscience, biology and psychology, but in our most popular majors (i.e. engineering, computer and information science, business, and architecture). Two recent examples of Art_x courses will be presented. Both classes included reading science and art texts, neuroscience lectures, and critical analyses of data. Example 1: *Sensibilities: WritingXDiscipline* is an upper-level communication-intensive seminar course. This course drew from the tremendous resource of Experimental Media and Performing Arts Center (EMPAC) to inspire students' creativity and curiosity and to cultivate writing skills through the transdisciplinary theme of the senses. Students had the opportunity to observe unique art/science presentations and performances in theater or studio settings at EMPAC and interact with artists, curators, and (neuro)scientists in the classroom. These rich experiences provided seeds for in-class discussions and writing projects. This course has matured and grown since its first offering. Enrollment has steadily increased (Fall 2015, n=6); Fall 2018, n=19). Example 2: *Cultivating Curiosity: Arts & Neuroscience* is a new course offered for first year, first semester college students. This course asks: Feeling curious? This *communication-intensive course* mixes practice-based learning with lectures and readings in both neuroscience and the arts. Classes cover basic knowledge of the brain and body from psychological, biological, and sociocultural perspectives as well as creative, artistic, and even playful engagements to gain insights into curiosity and body-mind relationships. Although the general consensus from the students themselves, and their assignment grades, suggest that working outside their comfort zone in the beginning of these courses was challenging; the majority of students adapted and flourished by the end. Students' analyses of both of these courses have been positive. These are just two examples of how to teach neuroscience in the rich context of the arts and humanities.

Disclosures: T. Hahn: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.13SU/LLL26

Topic: J.02. Teaching of Neuroscience

Title: Exploring neuroanatomy technologies: A “brain in hand” approach utilizing 3D models for undergraduate learning

Author: *C. WILSON
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Abstract: Cadaver study helps prepare students for careers in health sciences by offering them an accurate, powerful experience as they interact with real human tissues like the brain. Costs to purchase, maintain facilities, and store tissues can be prohibitive and students are often hesitant to interact directly with the cadavers. Computer technologies, such as “virtual” bodies, provide alternative teaching tools, but students are often limited by their two-dimensional nature and loss of the context of the surrounding tissues. To overcome possible disadvantages of screen-based learning, we supplemented our virtual cadavers with 3D printed models. Models were made on a Dremel 3D40 using 1) medical images, based on CTs or MRI scans by utilizing *Anatomage’s InVivo* image analysis software; 2) *de novo* using computer design derived from medical imaging; or 3) sourced as freeware online. Students were asked to incorporate the 3D printed models into a presentation and then kept their model to prepare for exams. Student feedback indicated the assignment stimulated interest in the subject and in 3D printing, and helped with their summative assessments. Most students preferred the models designed from medical images, rather than *de novo* or freeware-based designs. An advantage of using the medical images is that the students can directly compare the radiological scans with the 3D models. One disadvantage is scan availability; images were collected from cadaver tissues or from anonymized volunteers who had undergone diagnostic imaging. Obtaining scans can be challenging, but these results indicate 3D models are more highly preferred if created from radiological imaging. While processing these images can be time-consuming and involve a steep learning curve, this new and rapidly evolving technology could be used in any neuroanatomy course with access to 3D printers.

Disclosures: C. Wilson: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.14SU/LLL27

Topic: J.02. Teaching of Neuroscience

Title: An interdisciplinary laboratory exercise in synaptic transmission: MATLAB analysis of quantal release at the fruit fly neuromuscular junction

Author: S. KUMAR[1], D. L. DEITCHER[2], *B. R. JOHNSON[2]
[1]Mol. Neurobio. Lab., Salk Inst. For Biol. Studies, LA Jolla, CA; [2]Neurobio. and Behavior, Cornell Univ., Ithaca, NY

Abstract: The Cornell University class, Principles in Neurophysiology (BioNB 4910, cross-listed in Biomedical and Electrical and Computer Engineering), is an undergraduate Neurobiology course with a mixed Biology and Engineering student population. The course attempts to create a learning environment that cross-fertilizes the expertise of these two student groups. In the lab exercise presented here, students combine experimental and computational tools to explore quantization of synaptic vesicle release. Students recorded miniature end plate potentials (MEPPs) from the neuromuscular junction of 3-4 days post fertilization wild type (w^{1118}) fruit fly larva. Larva were dissected to expose the body wall muscles and placed in ringer solution at room temperature. Conventional intracellular recording techniques recorded spontaneous MEPPs using glass microelectrodes (3M KCl; 10-30 MOhm). The amplified signal was saved through LabChart 8 software (ADInstruments). Biology and Engineering students worked together to record synaptic events, apply engineering techniques to analyze the data, and to understand the principles underlying neural signal transmission. Students wrote a MATLAB program to analyze MEPP amplitudes by first filtering low and high frequency noise. A user defined polynomial function of higher order fitted the background voltage using the MATLAB function “polyfit”; this was subtracted from the raw data to remove low frequency noise. To remove high frequency noise, MATLAB function “smooth” replaced every data point with an average of user chosen, adjacent data points. MEPP peaks were determined with the MATLAB function “find peaks” by providing an appropriate value of voltage threshold and inter-peak separation. The output of the “find peaks” function was plotted as a histogram to display the number of MEPPs of different amplitudes. The histogram was fitted with a normal distribution function of MEPP peaks with values of a primary amplitude, consistent with excitatory post-synaptic potentials being produced by fusion of multiple synaptic vesicles. Students use the MATLAB routine to explore MEPP distributions between normal and mutant flies, and determine the synaptic site of action of neuroactive compounds. The different skills each student disciplinary group brings to the teaching lab enhances the experience of both students and faculty.

Disclosures: S. Kumar: None. **D.L. Deitcher:** None. **B.R. Johnson:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.15SU/LLL28

Topic: J.02. Teaching of Neuroscience

Support: NIH Grant GM109817 to AMK
HHMI UTEP PERSIST Education Grant teaching assistantships to BEP and KN
NIH 8G12MD007592 (Border Biomedical Research Center)
HHMI UTEP PERSIST Education Grant post-doc support to AM

Title: Introducing undergraduates to neuroscience literature: A pilot study involving knowledge engineering approaches

Author: *C. D'ARCY[1], A. MARTINEZ[1], B. E. PINALES[2], K. NEGISHI[2], G. A. BURNS[5], A. M. KHAN[3], J. T. OLIMPO[4]
[1]Biol. Sci., Univ. Texas El Paso, El Paso, TX; [2]Biol. Sci., [3]Dept. of Biol. Sci. and Border Biomed. Res. Ctr., [4]Dept. of Biol. Sci., Univ. of Texas at El Paso, El Paso, TX; [5]Intelligent Systems Div., Information Sci. Inst., Marina Del Rey, CA

Abstract: While a vast corpus of readily-available systems neuroscience literature exists, the ability to ***effectively synthesize*** cross-disciplinary information in this domain is challenging. Neuroscience knowledge is multi-scale, semantically complex, reported in natural language, and difficult to model within neuroinformatics systems. In classroom contexts, the task of engaging with the complexity of the neuroscience literature is iterated by every undergraduate when they first attempt to understand primary literature. If we were able to directly support students in this effort, we could: (a) greatly accelerate students' progress with this challenging task and (b) crowdsource the construction of knowledge bases that organize the information contained in scientific papers. In an effort to address this need, we developed and employed a knowledge engineering module to scaffold undergraduate students' (*n*= 23) ability to capture knowledge and represent neuroscience facts in neuroinformatics systems. Mixed methods approaches were used to examine the impact of employing this knowledge engineering framework on students' development of foundational science literacy skills. Furthermore, the feasibility of using this framework to engage students in a crowdsourced annotation effort was assessed. Among three neuroscience articles assigned, students' pre-existing ability to identify data endpoints, key methods, and author conclusions demonstrated a low-to-moderate level of proficiency. In using the framework, students were able to identify key entities and define object properties of the experiment but fell short in producing appropriate links within knowledge diagrams. However, protocol diagrams and identification of data endpoints demonstrated moderate gains across the three articles, suggesting that further practice coupled with formative feedback in applying the model may increase proficiency. Importantly, though students identified a need for more explicit instruction in order to properly apply the framework, they reported that the framework promotes information accessibility and is a beneficial approach to literature analysis.

Disclosures: C. D'Arcy: None. **A. Martinez:** None. **B.E. Pinales:** None. **K. Negishi:** None. **G.A. Burns:** None. **A.M. Khan:** None. **J.T. Olimpo:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.16SU/LLL29

Topic: J.02. Teaching of Neuroscience

Support: University of Wisconsin-Platteville Innovations in Teaching Technology Award

Title: Using a psychophysiology lab in introductory psychology to teach neuroscientific concepts

Author: *K. HALFMANN
Psychology, Univ. of Wisconsin - Platteville, Platteville, WI

Abstract: Understanding the biological basis of human behavior is a central theme in psychology. Yet, students in general psychology often find biological psychology (i.e., neuroscience) concepts both intimidating and challenging. Moreover, psychology majors often express a lack of interest or intimidation by biological psychology courses, tending to avoid or delay enrolling in these courses. Dunn and colleagues (2007) suggest that enhanced laboratory technology increase psychology program quality, because these resources improve student collaborative and scientific inquiry skills. I examined whether using a laboratory lesson to teach biological psychology concepts related to student perceptions of learning and participation. Specifically, I developed a physiology lab for my spring 2018 general psychology course. I used the Neulog plug-and-play electrodermal activity (EDA) technology in general psychology to teach part of our biological unit related to stress and emotion. NeuLog provides relatively inexpensive, portable learning modules for recording these data in a variety of settings. In class, students observed a demonstration of measuring a student's EDA while undergoing a set procedure to elicit an EDA response. Then, students worked in groups of four to six to measure EDA in at least one group member, while answering a set of questions related to the stress response. Through this exercise, students were able to directly observe and experience various conditions that elicit EDA. Approximately 100 students across three sections of general psychology reported their perceptions of learning and participation following the demonstration and subsequent use of the NeuLog EDA module. Students reported improved course quality and enhanced learning, relative to a neutral baseline, following the use of NeuLog technology. In future semesters, I will test the hypothesis that hands-on technology, such as these psychophysiology modules, enhances student understanding of relevant concepts using assessment of student learning (i.e., going beyond student perceptions of learning). Initial results suggest that these types of active, hands-on learning opportunities in general psychology improve student perceptions of learning and engagement in the course, which may subsequently improve student motivation to achieve in the course.

Disclosures: K. Halfmann: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.17SU/LLL30

Topic: J.02. Teaching of Neuroscience

Support: Fund for Undergraduate Scholarly Experience, University of Nebraska at Omaha

Title: Supporting undergraduate scholarly experience

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

Abstract: At the University of Nebraska at Omaha, undergraduates have the opportunity to apply for a competitive intramural research grant titled the Fund for Undergraduate Scholarly Experience (FUSE). A funded FUSE award provides a summer stipend of $2,000 for the student and a $500 materials budget for the lab in which they are working. Students must work alongside a faculty mentor to design an experiment, write and submit a grant proposal, complete a minimum of 200 hours of work, and present the results of their project at a campus-wide research fair the following academic year. The Sensory System Development Laboratory has hosted 22 successful FUSE applicants from 2011-2018. Students ranged from freshmen to juniors majoring in neuroscience, psychology, philosophy, biology, or biotechnology. While each experiment falls within the overarching theme of the lab, specific projects have varied from behavioral observations to cellular histology, with the topic being largely dependent on a student's area of interest. While the time and monetary costs associated with these projects often result in a net loss for the lab, the educational outcomes are beneficial across all levels of the academic spectrum. Undergrad involvement in scholarly research experience has been consistently shown to increase student engagement, comprehension, and retention, making them a worthwhile investment for any university. Apart from bench skills, students must learn to work independently, exercise time management, and practice written and oral communication. These are all skills that translate well to future careers in or out of academia. Having FUSE students in the lab also provides training and mentorship practice for graduate students, valuable experiences that are often overlooked in the traditional graduate curriculum. Faculty mentors may have the least to gain from these partnerships, particularly those who are post-tenure, and schools aiming to facilitate a vibrant undergraduate research program should incentivize faculty participation in these types of programs. We will present a representative timeline for a successful undergraduate research project from project design to final poster presentation. We will also discuss some of the challenges of working with undergraduate researchers and share strategies for success we have developed over the past 7 years of involvement with the FUSE program.

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

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.18SU/LLL31

Topic: J.02. Teaching of Neuroscience

Title: Dance and the Brain: Promoting the understanding of neuroscience through entrainment of aesthetically pleasing movement

Author: *E. P. WIERTELAK[1], J. LILE[2]
[1]Neurosci., [2]Theatre and Dance, Macalester Col., Saint Paul, MN

Abstract: To Dance. Humans and some other animals are capable of aligning their movements in time and space, whether between or in tandem with other individuals, or on a solitary basis. Dancing, then, is a reflection of mechanisms deeply embedded in the general structure and functions of the nervous system, yet traditionally, efforts to study it have not come from neuroscience. However, interest in dance among neuroscientists is growing, and a literature devoted to its research is building. It was with this research, and an abiding dedication to dance and its mastery, that a specialized seminar called "Dance and the Brain: the neuroaesthetics of neuroentrainment", was co-offered and co-taught by faculty from our institutions' programs in neuroscience and dance. A central focus of the seminar was for the participants to elucidate for themselves, and the entire group to confront intellectually, a suite of methods by which the functions of the nervous system could be capitalized on, to promote more effective entrainment of movements that further resonate with subjective appraisals of aesthetic appeal as dance. Students from across majors were allowed to register for the course, and no previous experience with dance or neuroscience was required. Through combined lectures and discussions about the nervous system with dedicated movement exercises, students increased their understanding of a variety of concepts in neuroscience and expanded their awareness of functional neuroanatomy. A final project required participants to demonstrate neuroentrainment of a dance sequence while reflecting on the contributing mechanisms to the accomplishment of their dance. Details of the seminar, how it was organized and key outcomes of the course are discussed.

Disclosures: E.P. Wiertelak: None. **J. Lile:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.19SU/LLL32

Topic: J.02. Teaching of Neuroscience

Title: Experimental group activities to promote intuitive understanding of neural network functions through role-playing

Author: *G. RIESEN[1], J. L. GARDNER[2]
[1]Neurosci., Stanford Univ. Dept. of Neurol. and Neurolog. Sci., Stanford, CA; [2]Psychology, Stanford Univ., Stanford, CA

Abstract: Neural networks are central to cognitive neuroscience, but providing students with an intuitive understanding of their function remains a challenge. Existing materials are often dry and math-heavy, presenting a barrier to engagement. We have had success teaching neural network principles using physical games where students take on the roles of neurons. We present two games we have developed which demonstrate feature detection and pattern completion. In the first, students act as neurons in the visual stream and simulate the development of orientation selectivity from cone cells to complex cells. Each 'cone cell' student looks at a screen through a template which defines their receptive field, and raises their arm ('is active') when they see light. Students further behind act as higher-level units, whose activities depend on the students in front. Patterns of light and dark are shown to mimic classic electrophysiology experiments. In this simple network, 'complex cell' students are seen to develop orientation selectivity with position- and size-invariance. Students can explore how changes to the system affect these properties in real time, and even use their experiences to imagine how new features might be encoded. This is a powerful way to build intuition for otherwise abstract qualities. In the second activity, students act as neurons in hippocampal area CA3 and simulate recalling different characters whose features are described in a slide show. Each student has a sheet specifying their tuning function (e.g. no response for <5' tall, medium for 5'-6' and max for >6') and current activity level (a stack of up to four foam cubes). Groups of four students connect to form tiny Hopfield nets, with a positive or negative connection between each pair of students. They then take turns passing out excitatory or inhibitory impulses (colored chips) based on their connections and activity levels. The networks can stably represent two characters and recover their patterns ('recognize them') from incomplete information (e.g. after a haircut). Students then work out how to build their own networks to recognize new characters. This provides a memorable context in which to situate ideas like Hebbian learning and excitatory-inhibitory balance. In fact, students often hit upon these ideas spontaneously as they played the game! Both of these activities give students first-hand knowledge of how simple rules can give rise to complex network functions, and empower them to carry out their own experiments in the classroom. We hope that activities like these can help to make neural network concepts more concrete in a fun and memorable way.

Disclosures: G. Riesen: None. **J.L. Gardner:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.20SU/LLL33

Topic: J.02. Teaching of Neuroscience

Support: UCLA Office of Instructional Development, Instructional Improvement Grant

Title: Teaching *in vivo* neuropsychopharmacology in an undergraduate research module

Author: *A. IZQUIERDO[1], W. E. GRISHAM[2]
[1]Dept. of Psychology, [2]Dept Psychol, UCLA, Los Angeles, CA

Abstract: Here we report the development and refinement of an instructional laboratory module aimed at providing undergraduate psychobiology and psychology students, mostly juniors and seniors, first-hand experience with conducting behavioral neuropharmacology research studies. The primary objective of this module was educational rather than to produce novel empirical results. All methods were approved by our institutional Animal Research Committee prior to the module. Groups of 24 students watched a live video feed in a data collection room adjacent to a testing room where certified and experienced rat handlers tested male and female adult Long-Evans rats on a battery of behavioral tests following drug exposure. Students were required to fill out a Medical Health Questionnaire ahead of time and to wear appropriate lab attire, but were never put in direct contact with the animals. The drugs and behavioral assays chosen were well established to assess acute drug effects in rats and could be repeatedly administered with appropriate drug washout. We have thus far tested animals following acute low doses of subcutaneous methamphetamine, methylphenidate, diazepam, fluoxetine, or vehicle for behavior on the open field, radial arm maze, and elevated plus maze. Students collected, analyzed, and then wrote mini-manuscripts on this primary data. Across the three iterations of this lab module offering, we have incorporated testing of female not just male rats and have imposed a requirement that students integrate what is known about the drug effects on the brain, supported by Pubmed searches and cited peer-reviewed work. In order to make the most efficient use of the rats, we conducted experiments that were consistent with the overall research goals of the instructor on record. As such, following the 3-week lab module, the rats were transferred to the instructor's approved research protocol and/or offered to other investigators in the department. Even though the primary goal was methodologically instructional, another aim was to contribute to ongoing research needs, consistent with the *Reduce* and *Refine* categories of the 3R's (Replacement, Reduction, Refinement). Each year, 140 students take this 3-week PSYCH 116 Behavioral Neuroscience laboratory to fulfill their major requirement. Consequently, it presents a unique opportunity to outline the responsibilities and relevance of this kind of research to a great number of students. We present future ways to simultaneously reduce the number of animals used and incorporate more specific pharmacological manipulations in the future: by preparing fewer animals with cannulae, DREADDs expression, or in vivo imaging devices.

Disclosures: A. Izquierdo: None. **W.E. Grisham:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.21SU/LLL34

Topic: J.02. Teaching of Neuroscience

Title: Teaching scientific literacy and communication via "Sex and the Brain"

Author: *T. TAN
Neurobio., Harvard Med. Sch., Boston, MA

Abstract: An important aspect of scientific training is learning to accurately communicate scientific results to diverse audiences through a range of written, oral, and visual means. “Neurotutorials” at Harvard College are small, year-long courses intended to teach upper-division undergraduates to read and analyze primary scientific literature through in-depth study of specific topics within neuroscience. Leveraging this course format, I designed a “Sex and the Brain” to teach students how to seek out, evaluate, and communicate scientific information course using the engaging topic of sex differences in the nervous system. This topic is not only timely, given the recent NIH mandate that researchers consider sex as a biological variable, but it also provides a wealth of case studies for poor scientific communication, as research in this field is regularly sensationalized when conveyed to the general public. I defined learning objectives for the course in three intellectual domains - scientific content, scientific literacy, and science communication - that encompass the abilities to 1) extract and summarize basic content (e.g. facts or methods) from scientific sources; 2) find scientific information from primary and secondary sources and evaluate the validity of scientific claims from those sources; and 3) effectively convey scientific information using different media. In support of these objectives, students discussed primary scientific articles and completed homework assignments that included paper summaries written either for a formal scientific audience or in the *eLife* “digest” format, visual abstracts, and blog posts for our course blog (**https://sexandthebrain.wordpress.com**). The fall semester concluded with a written midterm in the *Journal of Neuroscience* “Journal Club” article format, while the spring semester culminated in a public symposium in which students delivered “chalk talks” on neural sex differences. Pre-/post-course survey data and student reflections from the inaugural offering of the course during 2017-18 indicate that students enjoyed the course and are more comfortable seeking out scientific information, reading scientific articles, and communicating about science.

Disclosures: T. Tan: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.22SU/LLL35

Topic: J.02. Teaching of Neuroscience

Support: NIH grant DA035958
NIH grant AA02919

Title: Teaching synaptic transmission using primary literature: a skills-based approach to increased student engagement

Author: *K. BILLS, A. PAYNE, S. STEFFENSEN, 84602
Interdepartmental Program in Neurosci., Brigham Young Univ., Provo, UT

Abstract: Neuroscience is a burgeoning and intensive undergraduate major at Brigham Young University and at many other institutions. However, many areas in Neuroscience education need further development. This field needs engaged, active learning and a focus on the development of real-world transferable skills. Skill development is particularly important to neuroscience, as its interdisciplinary nature provides an abnormally broad range of potential careers for graduates. Here we use analysis of seminal primary literature articles to provide a skills-based approach to learning neuroscience, specifically as we teach synaptic transmission. Figures were extracted from these studies and used in conjunction with directed questions to guide students' analysis of the data. Student-led panel discussions were conducted to facilitate active learning from these studies. Our experience using the lesson plan in conjunction with the student feedback we received suggest that this method is effective at engaging students in the learning process, teaching synaptic transmission, creating meaningful discussion on primary research data, and helping students to exercise their skills in data analysis and scientific reasoning. Preliminary data suggests this could be a viable skills-based approach to neuroscience teaching.

Disclosures: K. Bills: None. **A. Payne:** None. **S. Steffensen:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.23SU/LLL36

Topic: J.02. Teaching of Neuroscience

Title: An innovative approach to a neuroscience capstone learning experience

Author: *A. J. PAYNE, K. B. BILLS, S. C. STEFFENSEN
Neurosci., Brigham Young Univ., Provo, UT

Abstract: Many students leave college underprepared for their desired careers. Consequently, there is a substantial need in higher education to create opportunities for students to develop real-world, transferrable skills, specifically in Neuroscience education. In recent years there has been a considerable effort from many education researchers to improve the quality of Biology education, primarily by an increase in pedagogical tactics such as backward design, active learning, and constructivist approaches. However, there are still many advances that need to be made, and these optimal learning principles need to be applied to Neuroscience education specifically. Here we propose a novel Neuroscience capstone learning experience that is focused on the development of real-world skills and that is customized to each student's needs and career plans. The students begin with guided self-discovery using tools such as the Meyers-Briggs Type Indicators (MBTI), The DiSC profile, and The People Code to gain greater insight into their own preferences and find an optimal career fit. They are then led to evaluate their current career interests and interview professionals in that field and to assimilate this information into their personal preferences framework (PPF). Each student then prepares a customized proposal for a high-quality, real-world, portfolio-grade project aimed at developing relevant skills applicable to his/her top career choices. The project proposal is reviewed, modified, and approved by the instructor/mentor, and the remainder of the learning experience consists of completing their custom project. This project work will be supplemented by a series of professional seminars and workshops that will provide skills and learning not obtained elsewhere in the students' program of study. Topics for these seminars and workshops may include business fundamentals and finances for scientists, entrepreneurship, collaboration and communication, human-centered design, and others derived from the interests and career plans of the current cohort of students. At the conclusion of the learning experience, the students should have a portfolio-worthy piece of work that showcases the skills they gained during their program and during the capstone experience.

Disclosures: A.J. Payne: None. **K.B. Bills:** None. **S.C. Steffensen:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.24SU/LLL37

Topic: J.02. Teaching of Neuroscience

Support: NSF Grant #35425

Title: Neurocasenet: Support for teaching neuroscience with cases

Author: L. A. ROESCH[1], P. MARSTELLER[2], *K. E. FRENZEL[1]
[1]Neurosci. and Behavioral Biol. Program, [2]Dept. of Biol., 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

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.25SU/LLL38

Topic: J.02. Teaching of Neuroscience

Support: Facultad de Medicina, UNAM

Title: A novel program in neurosciences in Mexico

Author: J. C. BARRERAS-MALDONADO[1], P. DURAN[2], *D. E. GARCIA-DIAZ[1]
[1]Dept. de Fisiología, Facultad de Medicina, [2]Facultad de Ciencias, Univ. Nacional Autónoma de México, Ciudad DE Mexico, Mexico

Abstract: A neurosciences undergraduate program recently started in Mexico as an opportunity to learn about theory and research of the brain and nervous system from a wide range of perspectives. It is an interdisciplinary study of several scientific fields combining basic neuroanatomy, neurophysiology, biochemistry, genetics, biology, psychology and pharmacology along with emerging disciplines in neuroscience. This program takes advantage of the advancement of science of multiple departments and campuses of the National University of Mexico (UNAM). It gets ranking information offering courses professed by outstanding neuroscientists in a novel and unique neurosciences program in Mexico and in Latin America. The purpose of this program is to improve neuroscience formation in undergraduate education shortening insertion in productive scientific fields as well as in advanced postgraduate programs. Neurosciences career includes working as neuroscientist in a research field of the neuroanatomy,

neurosurgery, neuropathology, neurophysiology, neuropharmacology, neuropsychology, neurorehabilitation and related fields. Subjects include mathematics for neuroscientists, biophysics, neuronal function, neuronal development, and cellular and molecular neuroscience. Neuroscience students will have access to the extensive resources and expertise of affiliated faculty across multiple departments and colleges throughout the UNAM. They can specialize in affective neuroscience, cognitive and behavioral neuroscience, molecular neuroscience, neuroimaging, neurophysiology, neuro-linguistics and social neurosciences. Graduated can work on deeper insights into the neural basis of mental activity, as well as developing new therapeutic approaches to address neurological disorders and psychological diseases dealing with clinical and psychological aspects of neuroscience. They will join workgroups in health sciences, industry, drug design, computational sciences and virtual reality. In sum, this undergraduate program in neurosciences is an interdisciplinary major leading to a Bachelor of Science in Neuroscience that takes advantage of multiple scientific groups, resources, laboratories and campuses of the UNAM.

Disclosures: J.C. Barreras-Maldonado: None. **P. Duran:** None. **D.E. Garcia-Diaz:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.26SU/LLL39

Topic: J.02. Teaching of Neuroscience

Title: Using the journal IMPULSE to enrich undergraduate curricula through neuroscience publishing

Author: C. FENNELL[1], M. N. PAVELKA[1], S. EVERETT[1], E. TURNER[1], Z. KAPLAN[2], C. H. GODFREY[1], L. JONES[3], *M. C. ZRULL[1]
[1]Psychology, [2]English, [3]Honors Col., Appalachian State Univ., Boone, NC

Abstract: Last year, IMPULSE - The Premier Undergraduate Neuroscience Journal was 15 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, as well as writing empirical papers, many students do not gain experience in the peer review process until they reach graduate or professional education. IMPULSE provides a venue for students to gain extensive peer review experience during their undergraduate education. The journal's peer review process, which is performed by over 100 students across 37 institutions throughout the world, 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). IMPULSE not only allows undergraduates to gain experience in peer reviewing but offers an outlet for publishing undergraduate research. Since January 2017, IMPULSE has published 10 research papers and 3 empirical literature reviews pertaining to various topics in neuroscience and 33 research articles and 10 review papers over the last 5 years. IMPULSE allows undergraduates to become more 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 critical thinking and problem solving through reviewing neuroscience literature.

Disclosures: C. Fennell: None. **M.N. Pavelka:** None. **S. Everett:** None. **E. Turner:** None. **Z. Kaplan:** None. **C.H. Godfrey:** None. **L. Jones:** None. **M.C. Zrull:** None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.27SU/LLL40

Topic: J.02. Teaching of Neuroscience

Title: Immersive learning in neuroscience education

Author: *T. H. GILBERT
Athabasca Univ., Athabasca, AB, Canada

Abstract: The teaching of science at all levels of education can be a challenging task. This is true for classroom-based instruction, and especially so when it comes to distance and online education. Athabasca University (AU) is a leading provider of distance and online education, and is committed to increasing equality of educational opportunity for adult learners worldwide by removing barriers that restrict access to university-level studies. A major challenge associated with online and distance education is engaging independent learners with material that encourages persistent active learning, enhanced knowledge retention, and improved learning outcomes. In a distance learning environment it is essential that the educational materials be designed properly to engage the student and promote learning. In an attempt to promote higher understanding of essential neurological structures and processes, we have developed a repository

of behavioural neuroscience resources. Specifically, these online resources allow students to study neuroanatomy, physiology, pharmacology, and sensation/perception. Significant features of our tutorial repository include interactive animations, auditory narrations, and self-tests. These online neuroscience educational resources provide the opportunity to further develop mastery of key neural concepts, mechanisms, and processes. A more recent addition includes a Virtual Behavioural Neuroscience Laboratory (VBNL), enabling an immersive exploration of the tools and equipment of a model lab.

Disclosures: T.H. Gilbert: None.

Theme J Poster

024. Teaching of Neuroscience: College II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 024.28SU/LLL41

Topic: J.02. Teaching of Neuroscience

Title: Survey of computational tools for reproducible science in the classroom

Author: *D. CELINSKIS
Sch. of Engin., Brown Univ., Providence, RI

Abstract: Active learning is becoming widely acknowledged as a powerful framework for ensuring the effectiveness of educational experience. However, despite wide acknowledgement of the value of active learning, at the grand scale, the transition towards more experiential learning proceeds at a very *slow pace*. It faces multiple barriers, including the need of significant resource investments and increased time commitment. Reproducible computational experiments present one type of activities that allow a shift away from the traditional "lecture-memorize-recall" form of learning towards more engaging experience. In the present study, I survey a number of computational tools from widely acknowledged ones (e.g. NEURON) to more niche-specific ones (e.g. custom developed tools reported by individual educators at SfN meetings). As an application example of some of such tools, I discuss my experience with teaching a mixed-level neuroengineering course aiming at instilling the understanding of the mechanisms behind the neural function and applying this knowledge to design assistive neural technologies. Early in the history of this course, NEURON was adapted as the main tool for teaching the basics of neural biophysics with a particular focus on Hodgkin-Huxley theory. However, given the sparsity of computational knowledge among the students, learning how to use NEURON GUI environment had a steep learning curve, and did not teach students relevant transferable skills. Consequently, in the latest iteration of the course, I took the inspiration from the Collaboratory environment developed by the Human Brain Project. One particular feature of this environment is the ability to perform collaborative computational modeling using Jupyter Notebooks. In our experience, the transition towards Jupyter Notebooks significantly accelerated the learning

process among the students and allowed to expand the scope of the material covered within the same timeframe. However, NEURON and Jupyter Notebooks are just two examples of the computational tools available to the community, and depending on the particular educational goals and context, other tools might be more appropriate. Hence, I review a range of such tools and discuss their suitability in teaching different facets of neuroscience and neuroengineering to the students of various backgrounds. I conclude my review by acknowledging the availability of a wide variety of tools developed by *individual* educators and scientists. However, expediting the transition towards more active learning at the national scale requires *more collaborative efforts* in developing educational software, hardware and physiological models.

Disclosures: D. Celinskis: None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.01SA/LLL42

Topic: J.02. Teaching of Neuroscience

Title: The making of a human neuroanatomy textbook

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

Abstract: Some textbooks have played a crucial role in the formation of researchers and clinicians in the field of neuroscience. This is the case of *Human Neuroanatomy*, a treatise that has been associated for more than 50 years with the University of Columbia (New York) and the publisher Williams & Wilkins (Baltimore). It started in the 1920s when two young histologists at Columbia - Oliver S. Strong (1864-1951) and Adolph Elwyn (1888-1955) - were revising *Bailey's Textbook of Histology,* a highly successful volume initiated in 1904 by their mentor Frederick R. Bailey (1871-1923). This gave Strong and Elwyn the idea of writing a book of their own dealing with neuroanatomy. They entitled it *Human Neuroanatomy* and it soon became a classic. The first three editions of this textbook (1943, 1948, 1953) were under Strong and Elwyn's sole authorship. Raymond C. Truex (1911-1980), a neuroanatomist at Temple University (Philadelphia), took over the 4th issue that appeared in 1959 as *Strong and Elwyn's Human Neuroanatomy*. The 5th edition came out in 1964 under the same title, but with Malcom B. Carpenter (1922-1999), a neuroanatomist at Columbia, as coauthor. Truex and Carpenter collaborated on the 6th version of the volume, which appeared in 1969 under the title *Human Neuroanatomy (formerly Strong and Elwyn's Human Neuroanatomy)*. The same title was used for the 7th and 8th issues of book. Carpenter was the sole author of the 7th edition (1976), but Jerome Sutin (1930-2005), a neuroanatomist at Emory University (Atlanta), joined him in the revision of the 8th issue (1983). Carpenter made significant additions to the book, such as the

inclusion of the superb macroscopic views of the human brain drawn by the well-known New Yorker artist Yvan F. Summers (1889-1964). Carpenter borrowed these drawings from another famous Columbia neuroanatomist, Fred A. Mettler (1907-1984), who had published them in his own *Neuroanatomy* textbook (C. V. Mosby, S. Louis, 1841, 1948). Finally, I was fortunate to being asked to take over the authorship of the 9th edition, which appeared in 1996 under the title *Carpenter's Human Neuroanatomy*. It took me five years of hard work to update the book, so as to render it more accessible to modern neuroscience students, as well as to neurology and neurosurgery residents. This 1011-pages-long version of the textbook comprises 580 illustrations, many designed to introduce new neuroscience concepts about brain function. My goal was to provide an integrated view of all the efforts made during more than half century by some of the major American figures in the field of neuroanatomy to bring neuroscientists and clinicians the best possible knowledge of the organization of the human nervous system.

Disclosures: A. Parent: None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.02SA/LLL43

Topic: J.02. Teaching of Neuroscience

Title: Development of low-cost tactile neuroanatomy learning tools for blind and visually impaired students

Author: *G. B. DINIZ, L. V. SITA
Dept. of Anat., Inst. of Biomed. Sci., Univ. of São Paulo, Sao Paulo, Brazil

Abstract: Visual impairment is the most common form of disability in the world. Complete vision loss results in severe challenges to the education and employment of young individuals. The obstacles faced by these persons cause loss of life quality and the occurrence of emotional problems. It is important, therefore, to provide the best possible higher education for these individuals, not only providing the same access to theoretical contents but also training them for their future work environment. The reliance of the neuroanatomy teaching on visual contents creates a set of challenges for teachers, a situation that is only worsened by the lack of specific neuroanatomy teaching tools for visually impaired students. To overcome this problem, a set of three-dimensional and bi-dimensional tactile tools was prepared using low-cost materials such as hot-melt adhesive, pins and easily found fabrics. These tools were then employed in an undergraduate class of physical therapy, speech therapy and occupational therapy students that included one completely blind individual. The use of tactile tools allowed for a full integration of the visually impaired student, who was able to participate in hands-on classes with her peers. That student scored a similar grade to her colleagues, indicating that the use of tactile materials is

an effective tool for neuroanatomy teaching. Hopefully, the ease of assembling and the low-cost may allow this experience to be replicated in several other institutions to allow a better preparation for visually impaired individuals in the neuroanatomy field.

Disclosures: G.B. Diniz: None. **L.V. Sita:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.03SA/LLL44

Topic: J.02. Teaching of Neuroscience

Title: Neuroscience capstone project for masters of science in medical health science students

Author: A. M. SHERFEY[1], *B. A. PUDER[2]
[1]Touro Univ., Vallejo, CA; [2]Basic Sci. Dept., Samuel Merritt Univ., Oakland, CA

Abstract: The Masters of Science in Medical Health Science (MSMHS) program at Touro University California is a 10-month program that includes basic medical science curriculum and an 18-week capstone research experience. The MSMHS program is designed to enrich the student's medical science content knowledge and to develop scientific inquiry and methodology skills. The goals of the program are to expose students to the rigor of medical school curriculum and enhance their critical problem solving abilities. Successful completion of the aforementioned goals allows many students to continue their scholarly pursuits in medical school or allied health graduate programs. Sixteen of the 120 enrolled MSMHS students from academic years 2016-2017 (n = 8) and 2017 - 2018 (n = 8) chose to participate in neuroscience educational research as their capstone project. MSMHS students worked in two member teams to design a neuroscience educational poster, presentation, and a hands-on activity on a self-selected neuroscience topic. The capstone projects are presented to local elementary, middle, and high school students during several neuroscience educational outreach events. Each session is designed to be relevant and age appropriate for the grade level participants. The quality and effectiveness of the capstone projects are assessed by participant completion of pre/post tests and surveys. Additionally, MSMHS graduate students completed a survey to provide feedback and perceptions of the research capstone experience. Data collected from MSMHS student surveys will serve as means to improve future capstone projects.

Disclosures: A.M. Sherfey: None. **B.A. Puder:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.04SA/LLL45

Topic: J.02. Teaching of Neuroscience

Support: Howard Hughes Medical Institute 56008821
contribution from Stoelting, Inc.

Title: Hands-on workshop on improving rigor and reproduciblility in preclinical behavioral testing

Author: *L. ANDERSON[1], K. LARUE[2], C. WRAY[2], S. J. SUKOFF RIZZO[1]
[1]Mouse Neurobehavioral Phenotyping Facility, [2]The Jackson Lab., Bar Harbor, ME

Abstract: Sufficient rigor and reproducibility is a major problem for preclinical studies, particularly for techniques with variability, such as behavioral assays. To this end, the NIH and several scientific journals have mandated guidelines and initiatives on reproducibility aimed at improving transparency in reporting including processes and methods for blinding, randomization, counterbalancing, inclusion of appropriate controls, and ensuring that experiments are adequately powered. Implementation of these best practices has been hindered by deficiencies in the training and proficiency of investigators in behavioral neuroscience leading to the publication of poorly executed behavioral data. Our objective was to provide trainees access to a hands-on behavioral training workshop that focused on approaches for executing best practices in designing and executing behavioral studies. This type of training program is in practice at The Jackson Laboratory's (JAX) Mouse Neurobehavioral Phenotyping Facility and has recently been developed into a 5 day hands-on training workshop. Our immersion training course model posits that hands-on instruction in behavioral testing by experts at a low student to teacher ratio in an active, purpose-built behavioral testing laboratory is fundamental to develop skills for performing complex scientific experiments with rigor and reproducibility. This workshop includes five main components: biomethods training to learn safe and standardized mouse handling, restraint, and dosing techniques; pre-training protocol review; protocol demonstration of the technique by the trainer; independent validation with the trainer observing the trainee, and data analysis and interpretation. This workshop requires participants to reproduce data within validation sets under blinded conditions before running mouse behavioral tests independently. This process emphasizes best practices and ensures reproducibility. Taken together, the long-term goal of this training is to ensure that rigorous, best-practice scientific methods are consistently applied in experiments generating preclinical behavioral data so that unbiased, robust, and reproducible findings are reliably attained across laboratories.

Disclosures: L. Anderson: None. **K. LaRue:** None. **C. Wray:** None. **S.J. Sukoff Rizzo:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.05SA/LLL46

Topic: J.02. Teaching of Neuroscience

Title: Development of an engineering-integrated clinical neuroscience medical curriculum: A novel case-centered problem-based medical education

Author: *R. GALVEZ[1], K. AHMAD[1], B. ALDRIDGE[1,2], J. AMOS[1,3], O. COIADO[1], E. T. HSIAO-WECKSLER[4,1], G. HUESMANN[5,7,1], D. LLANO[5,7,1], W. PLUTA[1], S. ROBERTS-LIEB[1], Y. VLASOV[6,1], J. YODH[1], J. ROWEN[1]
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Abstract: In July of 2018 the University of Illinois with Carle Foundation Hospital will welcome its inaugural class to the first engineering infused college of medicine in the nation, the Carle Illinois College of Medicine. In development of the curriculum for the Clinical Neuroscience course, along with all pre-clerkship courses, the college has enlisted a triad of expertise (neurologist, neuroscientist and engineer). This collaborative approach has enabled a fully integrated engineering, medical, and basic science curriculum that we believe will lead to a new generation of physician-innovators who will be instrumental in designing and implementing transformative approaches for healthcare delivery in the future.
In education literature, it is well documented that an active-learning strategy increases critical thinking skills, increases interpersonal skills, results in a better understanding of educational material, and results in better retention. Recognizing the advantages of such an educational strategy, Carle Illinois has utilized an active-learning, medical-case centered, educational format for the pre-clerkship medical curriculum. With this strategy, the educational objectives for each week will be integrated and/or centered around one to two medical cases that the students will work through as the week progresses.
Clinical neuroscience is an eight-week course that provides a fully integrated engineering, medicine, and neuroscience curriculum. Specifically, active-learning activities for each week (team-based learning activities, cadaver anatomy, manikin simulations, virtual/augmented reality simulations, engineering laboratories and standardized-patient activities) are all centered around one to two carefully designed medical cases per week that the students will explore in three two hour problem-based learning sessions. As an example of one integrated activity, during the week discussing a stroke patient, students will also explore the medical diagnostic properties of an MRI (medicine) along with corresponding neuroanatomical regions (basic science) and technological properties for improving medical imaging (engineering). The following poster will provide a detailed description of the rationale and methodology employed for course development, along with specific examples of active-learning educational activities that

effectively integrate engineering, medicine, and neuroscience into the Carle Illinois Clinical Neuroscience medical curriculum.

Disclosures: K. Ahmad: None. **B. Aldridge:** None. **J. Amos:** None. **O. Coiado:** None. **E.T. Hsiao-Wecksler:** None. **G. Huesmann:** None. **D. Llano:** None. **W. Pluta:** None. **S. Roberts-Lieb:** None. **Y. Vlasov:** None. **J. Yodh:** None. **J. Rowen:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.06SA/LLL47

Topic: J.02. Teaching of Neuroscience

Title: Integrating student education in the research process with a stereological study: The effects of environmental enrichment on the number and size of th+ neurons in the substantia nigra pars compacta in rats

Author: *S. O. AHMAD[1], J. JOSEPH[2], E. SPALDING[3], N. STEVENS[3], S. TOTH[3]
[1]Doisy Hlth. Sciences: Office of Occup. Therapy, St. Louis Univ., Saint Louis, MO; [2]St. Louis Univ., Sait Louis, MO; [3]St. Louis Univ., Saint Louis, MO

Abstract: This research consisted of a process of educating students on quality control methods and assuring numbers and statistical analysis in the process of stereology. The process allows students, in search of more experience in morphometry, to check their results against known values, yet maintain progress in novel research.Enriched environments create a living environment where rats could engage in natural behaviors. For the enriched environment (EE) rat model, sixteen Sprague-Dawley rats (8 males, 8 females) were used. These 16 brains were obtained from 8 rats exposed to EE and 8 rats to standard environment (SE) for about 2 months . In EE, toys (objects of wood, metal, plastic, leather, and cardboard) were available at all times in the cage and items were alternated every three days for novelty. SE had no toys and were used in a transparent plastic laboratory cage lined with wood shavings. Free-floating sections were stained for tyrosine hydroxylase (TH). The *Stereologer* software package was used to estimate neuronal number with a Nikon Eclipse 80i microscope (4x and 3,600x).The Stereologer software package (Stereology Resource Center, Baltimore INC, Baltimore, MD) was used to estimate neuronal number with a Nikon Eclipse 80i microscope (4x and 3,600x), connected with a Sony 3CCD Color Digital Video Camera, which operated an Advanced Scientific Instrumentation MS-2000 motorized Stage input into a Dell Precision 650 Server and a high resolution plasma monitor. Using design-based stereology, the number of TH-positive neurons was quantified in the SNpc of the rats using the nucleator method and the dissector principle. For the estimation of neuronal number, every 8th section containing the SNpc (Bregma -2.54 to -3.88mm) was selected from a random initial sort, and the largest acceptable coefficient of error (CE) was set at

.15. For the estimation of neuronal number, every 8th section containing the SNpc (Bregma -2.54 to -3.88mm) was selected from a random initial sort, and the largest acceptable coefficient of error (CE) was set at .15. In EE rat model, a significant difference of the number of TH-positive neurons in the SNpc between SE and EE while design-based stereology did (4,144±244 in SE and 4,853±198 in EE. $p<0.05$). Design-based stereology significantly estimated 117.09±4.78% TH-positive neurons in EE with respect to neurons in SE ($p<0.05$) design-based stereology demonstrated a significant increase of TH-positive neurons by 17% ($p<0.05$). Research was conducted with 1 PI and Ph.D. student (responsible for the stereology), and 4 Master of Occupational Therapy Students (responsible for writing a paper and poster on the process and outcomes).

Disclosures: J. Joseph: None. **E. Spalding:** None. **N. Stevens:** None. **S. Toth:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.07SA/LLL48

Topic: J.02. Teaching of Neuroscience

Support: This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 785907 (HBP SGA2)

Title: Interdisciplinary education for innovative research infrastructures

Author: T. RASS, E. WINTERSTELLER, *A. SARIA
Dept. of Anat., Med. Univ. Innsbruck - Human Brain Project, Innsbruck, Austria

Abstract: In October 2013, the Human Brain Project (HBP) was launched as a European Flagship research project. The project strives to advance the fields of neuroscience, brain medicine and ICT by developing an overarching Research Infrastructure combining and interconnecting relevant methods and ideas from the different areas. In order to support this innovative and transdisciplinary approach and to distribute knowledge about the Project's results and tools, an interdisciplinary Education Programme has been developed as an element of the HBP. The HBP Education Programme has defined a teaching and training strategy tailored to the needs of the Human Brain Project. The programme consists of various formats targeted at early career researchers working in the main research areas of neuroscience, medicine and ICT. On the one hand, advanced schools are offered to tackle specific problems and questions of the various research fields. Once a year, a transdisciplinary Student Conference is organised to bring together young researchers from different disciplines, foster scientific exchange and provide a fertile soil for new, innovative ideas. In order to also target scientists outside their area of

specialisation, a special HBP Curriculum has been developed. It combines online courses and face-to-face workshops offering basic lessons in the key disciplines as well as modules dealing with complementary subjects like research ethics, intellectual property rights or the translation and exploitation of research results. Over the last two years, the HBP Education Programme Office has organised 13 events with a total number of 465 student participants and 185 lecturers and tutors who provided their know-how and contributed to the programme on a volunteer basis. At all events, a number of lectures, tutorials and student talks were recorded and added to the HBP Education E-Library to make the contents also accessible for the broader scientific community. A total of 260 videos are publicly available on the programme's YouTube channel. At a time when the field of science is constantly evolving and technologies are developing at an increasing pace, the mutual exchange of different perspectives and approaches plays an important role for the advance of new insights and ideas. Through its innovative and interdisciplinary training formats, the HBP Education Programme contributes to the education of a new generation of young researchers. It provides them with the necessary skills to see the bigger picture and interconnect different aspects of a problem, and thus work successfully within the framework of research infrastructures like the one of the Human Brain Project.

Disclosures: T. Rass: None. **E. Wintersteller:** None. **A. Saria:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.08SA/LLL49

Topic: J.02. Teaching of Neuroscience

Support: NIH NIGMS R25GM114827

Title: An interactive guide to neuronal data analysis for the practicing neuroscientist

Author: *E. SCHLAFLY, U. T. EDEN, J. W. BOHLAND, M. A. KRAMER
Boston Univ., Boston, MA

Abstract: Advances in technologies for measuring neuronal activity along with a decrease in data storage costs are driving a revolution in neuroscience. As new datasets accumulate worldwide, a new challenge has emerged: how to make sense of these complex data to provide biological insight and shed new light on neurological and neuropsychiatric disorders. This new, data-driven era of neuroscientific research demands that investigators master the fundamental methods in time series and image analysis and know when and how to appropriately apply these methods. Accessible, yet rigorous, resources to develop hands-on experience with modern data analysis techniques are currently lacking in neuroscience. Here, we present a digital companion to the textbook *Case Studies in Neural Data Analysis*. The textbook uses MATLAB to analyze

examples of neuronal data, and our contribution is to provide a Python supplement with each chapter implemented as a Jupyter notebook. The Jupyter notebook format includes interactive and hands-on implementations to accompany the mathematical concepts described in the textbook. Coded examples within the text engage the reader and allow them to explore mathematical ideas visually and develop intuitive understanding. Users can interact with the notebooks in two ways: locally through the GitHub repository, or using the notebooks in Binder through a JupyterHub server. We hope that the availability of interactive examples will facilitate learning, and we foresee this type of resource being widespread in the future.

Disclosures: E. Schlafly: None. **U.T. Eden:** None. **J.W. Bohland:** None. **M.A. Kramer:** None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.09SA/LLL50

Topic: J.02. Teaching of Neuroscience

Support: DFG PE1627/5-1

Title: R-based web applications for teaching behavioral and cognitive modeling in cognitive neuroscience

Author: *J. PETERS
Univ. of Cologne, Dept. of Psychology, Biol. Psychology, Cologne, Germany

Abstract: Cognitive neuroscience is increasingly embracing cognitive and computational modeling approaches in the analysis of behavioral and neural data (Forstmann, Wagenmakers, Eichele, Brown, & Serences, 2011; O'Doherty, Cockburn, & Pauli, 2017) but teaching such methods is associated with a number of unique challenges. For example, a fully hands-on approach that involves programming classes might not always be feasible due to time and curriculum constraints.
Here I present a set of R-based apps (created using the Shiny package) that allow students to explore the behavior of various cognitive models frequently applied in cognitive neuroscience. The apps can be accessed either using a local installation of R or via a web browser. The basic structure of each app consists of:
1)
An input section with a number of sliders and/or selectors allowing users to set the values for the model parameters.
2)
An output section that plots simulated data generated using the selected parameter setting as well as additional model-specific visualizations.

3)
Buttons to re-fit the model to the simulated data to explore parameter recovery.
The apps currently implemented include:
1)
Reinforcement Learning (Q-Learning) in the context of different reinforcement schedules (fixed reward rates, reversal learning, volatile bandits). Features: plotting of Q-values, choice probabilities, prediction error time courses.
2)
Delay discounting (hyperbolic and exponential) and risk taking (probability weighting). Features: plotting of discounting functions and softmax functions.
3)
Drift diffusion model (implemented via the *rtdists* package). Features: plotting of reaction time distributions.
The apps are currently used and evaluated in an undergraduate course on Biological Psychology and a Msc.-level course on Cognitive Neuroscience.

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Disclosures: J. Peters: None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.10SA/LLL51

Topic: J.02. Teaching of Neuroscience

Support: DFG SFB 1280

Title: SFB 1280 Extinction learning: A novel way to integrate research and teaching in cognitive neuroscience

Author: *G. SALZMANN, O. GUNTURKUN
Ruhr Univ. Bochum, Bochum, Germany

Abstract: We can easily learn and store new information. However, we are equally able to learn that once acquired information is no longer valid, and cease to respond to it. While the initial acquisition of knowledge is well studied, the process of extinction is far less understood. Extinction involves both forgetting as well as a new learning process that is different and far more complex than the initial learning event. Despite its relevance, the behavioral, the neural, and the clinical aspects of extinction are by far not understood. This is the primary motivation behind the creation of the Collaborative Research Center SFB 1280, which spans four universities and 19 research projects. We aim to study the neural, behavioral, ontogenetic, and clinical mechanisms of extinction in various species, including humans. The diversity of our approaches at the systems and at the methodological level is combined with a high level of homogeneity at structural, experimental, technical, and conceptual levels. This also gives us the possibility to combine cutting-edge research with novel ways of graduate education over up to 12 years. Our students are enrolled at our graduate school with a curriculum that starts with a lecture course on fundamentals of neuroscience. Obviously, we also run joint journal clubs, courses on grant applications, methods training, presentation skills, etc. In parallel, our students can organize and host regular international symposia to which they can invite international scholars. These symposia as well as many further activities are handled by our students on their own. To do so, they receive the necessary monetary resources as well as administrative support from the SFB 1280. If they want to do more than the resources allow, they are to find further resources by their own means. Thus, our students learn to act and network wisely at the international level. Another monetary source in the hands of our students is the “treasure trove”, an internal mini-NIH. Graduate students can apply for funding to test their own ideas from the treasure trove by submitting a short research proposal of maximally five pages, which is evaluated by two PIs of the Research Unit that come from a different lab. Altogether, our students learn very early to take over responsibility, to plan into the future and to collaborate within a thriving area of research.

Disclosures: O. Gunturkun: None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.11SA/LLL52

Topic: J.02. Teaching of Neuroscience

Title: Graduate school prioritization of application components: The most highly valued characteristics desired by top neuroscience programs

Author: *J. A. BOYETTE-DAVIS
Psychology, St. Edward's Univ., Austin, TX

Abstract: Increasingly, students are seeking entry into competitive doctorate-granting programs in the field of Neuroscience, yet the criteria by which students are being evaluated are not fully evident in the literature. The purpose of this study was to determine the value of specific application components, research skills, and personal characteristics that have historically been sought by graduate schools. The top ranked doctorate-granting programs in neuroscience (n=82) were identified using data from the National Research Council and asked to complete a survey using Qualtrics. A total of 39 programs completed the survey. Respondents used a 1 (not at all valued) to 7 (incredibly valued) Likert scale to indicate value ratings for 7 common application components (basic research, communication skills, academic success, volunteering, teaching experience, coursework, and letters of recommendation). Those 7 components were also ranked from 1 (least essential) to 7 (most essential). Similar ratings and rankings were requested for seven areas of research (previous rodent research, bench skills, understanding of statistics, ethics training, data collection using human participants, scientific writing experience, and background knowledge in a specific specialty). Finally, respondents used the Likert scale and rankings approach to indicate the value of various personal characteristics, including persistence and critical thinking. The results showed that having basic research experience was the most essential component of the application (mean rating: 6.72; SD: .46), and letters of recommendation were the second most valuable component (mean: 6.67; SD: .48), with comments indicating that letters provide a means for application committees to best assess the personal characteristics provided in the survey. Teaching experience was the lowest rated item in the survey (mean: 2.61; SD: 1.23). Collectively, these data highlight the importance of undergraduate exposure to a host of research opportunities. The findings inform undergraduate students and faculty who mentor those students on strategies to adopt when preparing for entry into a competitive neuroscience-based graduate program.

Disclosures: J.A. Boyette-Davis: None.

Theme J Poster

025. Teaching of Neuroscience: Graduate and Professional

Location: SDCC Halls B-H

Time: Saturday, November 3, 2018, 1:00 PM - 5:00 PM

Program #/Poster #: 025.12SA/LLL53

Topic: J.02. Teaching of Neuroscience

Support: NINDS Advanced T32 Training Grant

Title: The Brown University Neuropracticum: Advanced graduate training at the marine biological laboratory

Author: *C. I. MOORE[1,2], D. D. SLIVA[1,2], K. S. YANAGI[1,2], A. C. OYALOWO[1,2], A. I. MORE[1,2], C. A. DEISTER[1,2], M. PESCOSOLIDO[1,2], R. ST. LAURENT[1,2], J. J. ALLEN[1,2], D.

LIPSCOMBE[1,2], A. C. HART[1,2]
[1]Neurosci., Brown Univ., Providence, RI; [2]Carney Inst. for Brain Sci., Providence, RI

Abstract: Each January, the Brown University Neuroscience Graduate Training Program brings a cohort of graduate students to the Marine Biological Laboratory for intensive, 8-day training in advanced research methods, the 'NeuroPracticum.' Student attendees consist of our 1st year class (N = 12-14), including students enrolled in the NIH Graduate Partnership Program (NIH GPP) at Brown. In 2-day rotations, these students receive hands-on training in neuroscience methods: Examples of past rotation topics include *C. elegans* behavioral genetics, intracellular physiology, 2-photon microscopy, electroencephalography, 1-photon awake imaging (bioluminescence and fluorescence), and *in vivo* extracellular electrophysiology. For the past 4 years, we have also included the cohort of 3rd-4th year students enrolled in our NINDS Advanced T32 Training Grant (TG) (N = 4-5 students). These students meet weekly throughout the fall with the TG PIs to develop unique projects to be conducted at the NeuroPracticum. A key goal is to allow students to explore a scientific domain they would not otherwise be able to, learning by doing. Past projects have included novel studies of epileptic activity in a novel mouse model of autism and the efficacy of new bioluminescent constructs in cell culture. In some cases, students have also/instead opted to gain mentorship training and served as co-Instructors of a 1st year rotation. This year, the TG cohort conducted novel studies of mechanisms of octopus camouflage. Cephalopod camouflage is in part achieved by changes in the conformation of neuromuscular chromatophore organs in response to changes in light. Recent findings in a nocturnal species (*Octopus bimaculoids*) found that this highly effective camouflage response was exclusively driven by blue/green light, and not dependent on retinal processing or central neural representations (Ramirez and Oakey, 2016). In this year's TG project, we tested whether the same chromatophore sensitivity and specificity was present in a diurnal octopus, *Abdopus aculeatus*, known for using terrestrial locomotion to move between tidal pools. Students drove all phases of this project, including hypothesis generation, protocol design and experimental rig invention/construction. We discovered that this species (N = 3) also shows light-driven chromatophore responses, with similar independence from central visual processing. Interestingly, in addition to blue/green light, red light stimulation was also effective in some cases in driving chromatophore responses at a longer latency. This suggests some variation in chromatophore responsivity and dynamics across octopus species.

Disclosures: C.I. Moore: None. **D.D. Sliva:** None. **K.S. Yanagi:** None. **A.C. Oyalowo:** None. **A.I. More:** None. **C.A. Deister:** None. **M. Pescosolido:** None. **R. St. Laurent:** None. **J.J. Allen:** None. **D. Lipscombe:** None. **A.C. Hart:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.01SU/DP15/LLL54

Topic: J.03. Public Awareness of Neuroscience

Title: Crescent Loom: Weaving biophysical motor circuits to control 2D underwater creatures in an accessible video game

Author: *W. M. PERRY[1], G. BARELLO[2]
[1]Biol., Reed Col., Portland, OR; [2]Univ. of Oregon, Eugene, OR

Abstract: It is a challenge to illustrate the temporally- and spatially-complex subject of neurophysiology through static mediums such as diagrams. However, despite the well-established math and rapid expansion of computing power over the last two decades, people looking for easily-accessible neural simulations have exceedingly few options. We have developed a video game called Crescent Loom that wraps a sophisticated neural simulation in an easy-to-use interface where players design the body and corresponding brain of a 2D underwater creature. Constructed nervous systems are small -- typically between four and twenty neurons -- but include central pattern generators, sensory feedback, and changes in synaptic strength. Neurons are simulated using a resistor-capacitor compartmental model, showing in real time both passive and active current spreading within each neuron as well as the state of ion channels within each section of membrane. The inclusion of a body simulation gives the constructed nervous systems contextual relevance; players discover microcircuits like reciprocal inhibition through experimentation and problem-solving while trying to synchronize the activation opposing muscle groups. In preliminary field tests, we have brought it to three classrooms (undergraduate, high school, and middle school) and eight game conferences. By combining modern game design techniques with well-understood computational simulations of neurons, we have created a program that for the first time gives the public easy access to an interactive neurophysiological model. We aim to maximize outreach and its exposure by providing it as a free in-browser resource to schools while selling a commercial version through online game marketplaces. As a whole, Crescent Loom provides a platform for educators to dynamically illustrate neurons, students to play with and discover the mechanics of nervous systems, and the public to be gently introduced to the foundations of neuroscience.

Disclosures: G. Barello: None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.02SU/LLL55

Topic: J.03. Public Awareness of Neuroscience

Title: NW Noggin on homelessness and the brain, seeing us all through research and art

Author: *W. S. GRIESAR[1,2], J. LEAKE[4,3]
[1]NW Noggin (PSU, OHSU, ...), Portland, OR; [2]Psychology, [3]Univ. Studies & Psychology, Portland State Univ., Portland, OR; [4]NW Noggin (PSU, OHSU ,...), Portland, OR

Abstract: “It’s like people see me as an object, not as a human being.” Science needs investment, and engaging people builds support for research and education. Integrating arts in STEM (“STEAM”) fosters innovative engagement. Here we report on efforts to bring together new researchers and outreach volunteers, clinicians, policy makers and, as equal participants, young members of our community who lack safe, secure places to call home. Nonprofit NW Noggin (nwnoggin.org) organizes graduates and undergraduates to collaborate and engage, building networks and inspiring people about discovery in neuroscience and art. Volunteers

benefit from working across disciplines and institutions, serving as “near peer” role models, gaining skill explaining work and thinking creatively about careers. We’ve met with over 20,000 K-12 students since 2012! Noggin loves to visit p:ear, a nonprofit for homeless youth. P:ear offers community, services and a welcoming educational and gallery space in Portland, Oregon, filled with caring staff and volunteers for young people without safe places to sleep. We’ve had powerful conversations with adolescents struggling to overcome drugs, anxiety, depression, abandonment, bias - and a strong sense that many people pass them by as if they weren’t valuable human members of our community. Harris & Fiske (2006) found that people respond harshly to those in “extreme outgroups,” including those without homes. These street kids are correct - some respond to them with “dehumanized perception.” Yet by asking subjects to engage with images of outgroup members, there is more activation of frontal lobe networks essential for responding to others as relatable human beings. Young people at p:ear created landscapes on plaster brain casts that powerfully conveyed their feelings, significant locations, and both actual and aspirational aspects of their lives in our shared community. In fall 2017, we put on a “Homelessness and the Brain” day at p:ear, and policy makers, clinicians, members of the public, young researchers from OHSU and PSU and houseless youth talked, listened and learned from each other about research on stress, anxiety, depression, sleep, emotional regulation, drugs, development, bias and resilience, and explored data, art and testimony from p:ear youth to illuminate links between a lack of affordable housing and all our brains. Building excitement and awareness of discoveries in neuroscience through arts-integrated outreach across institutional, state, federal and generational lines trains new scientists to collaborate on important community concerns, and increases awareness and support for investment in brain research and the arts.

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

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.03SU/LLL56

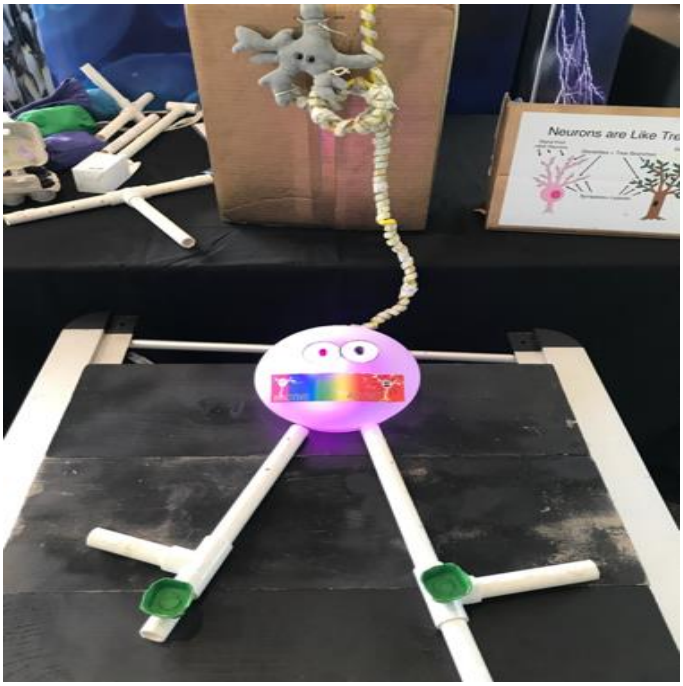
Topic: J.03. Public Awareness of Neuroscience

Support: Pacific Science Center
Paul G. Allen Family Foundation

Title: “Talk to A Brain Cell” exhibit is an effective educational and outreach tool to model neuronal function and synaptic plasticity with audiences of all ages and scientific backgrounds

Author: *A. J. LESIAK
Psychiatry and Behavioral Sci., Univ. of Washington, Seattle, WA

Abstract: “Talk to a Brain Cell” is an educational and outreach activity developed to model the basics of neuron function, neurotransmission, neuroplasticity, and neuropathology. This interactive activity was developed as part of the Pacific Science Center’s Science Communication Fellows program and has been presented at their Portal to the Public program’s “Meet a Scientist” events, as well as many other science outreach events. Activity participants model the release and re-uptake of neurotransmitters (beads) onto a model neuron that changes color corresponding to how “activated” the neuron gets in response to neurotransmitters. The shape and structure of the neuron can be dynamically adjusted to increase and decrease the ability of the participant to activate the neuron, modeling neuroplasticity, and highlighting the dynamic structures of neurons. Additionally, this activity can be used to describe and model the neuronal dysfunction underlying a variety of mental health disorders. I have found this activity to be an extremely useful tool to educate basic and advanced neuroscience principles to a variety of audiences with a wide range of scientific backgrounds and expertise. Participants often leave with a greater understanding of how their brains work, and an enhanced appreciation for how their brains are comprised of a massive network of interconnected and constantly changing neurons. The most impactful interactions with children tend to involve testing their hypotheses about what will happen when we change something about the neuron, for example changing receptor numbers or neuron shape. Adult participants tend to avoid directly participating in the activity but have found that visualizing the altered structure and function of neurons during pathology helpful in de-stigmatizing brain disease. In the future, I am excited to adapt this neuronal model for the college classroom, creating a dynamic and affordable activity to model neuron function, synaptic plasticity, and neuronal circuit dynamics.



Disclosures: A.J. Lesiak: None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.04SU/LLL57

Topic: J.03. Public Awareness of Neuroscience

Support: Columbia University GSAC funding

Title: We the Scientists: Tracking science policy at the federal and local level

Author: *C. BRAINE, M. DONEGAN, L. LONG, L. NUNNELLY, S. ROLLOTI, L. J. SIBENER
Columbia Univ., New York, NY

Abstract: We the Scientists is a resource to help scientists and science enthusiasts hold their representatives accountable for their voting record on science funding and sensible science policy. Often, science education and outreach efforts are concentrated in large research hubs, and we aim to take these efforts and replicate them in more rural settings. This aim can be broken down into two main components: 1) providing education materials for scientists in rural areas to inform the people in their districts about the importance of national support for science, and 2) compiling comprehensive factsheets about legislators' voting records. We have compiled educational resources from university outreach groups and information on how to lobby for science from groups like Society for Neuroscience. We have also compiled a list of bills that are science related and have gone through the voting records of all current United States Representatives and compiled legislator specific fact sheets into an interactive map. Using the resources from our database we have organized and educated scientists about their representatives ahead of congressional office visits. In the coming year we are working to expand this database to cover legislation before the US Senate, New York State Senate, and New York City Council. As we move forward and expand our chapter membership, we hope to continue to track local science related legislation across the country.

Disclosures: C. Braine: None. **M. Donegan:** None. **L. Long:** None. **L. Nunnelly:** None. **S. Rolloti:** None. **L.J. Sibener:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.05SU/LLL58

Topic: J.03. Public Awareness of Neuroscience

Title: ComSciCon: The communicating science workshop for graduate students

Author: *A. L. CALDWELL[1], N. SANDERS[2], M. DROUT[3], S. KOHLER[4]
[1]Neurosciences, UC San Diego, La Jolla, CA; [2]Astrobites, Boston, MA; [3]Carnegie Inst. for Sci., Toronto, ON, Canada; [4]AAS Nova, Washington, DC

Abstract: ComSciCon (comscicon.com) is a national workshop series organized by graduate students, for graduate students, focused on leadership and training in science communication. Our goal is to empower early career scientists to become leaders in their field, providing them with the skills they need to effectively participate in scholarly discourse and to engage with the broader public. ComSciCon attendees meet and interact with professional communicators, build lasting networks with graduate students in all fields of science and engineering from around the country, and create and publish original works of science media. ComSciCon consists of both a flagship national conference series run annually for future leaders in science communication, and a series of regional and specialized workshops organized by ComSciCon alumni nationwide. We routinely receive over 1000 applications for 50 spots in our national workshop. Since its founding in 2012, over 300 STEM graduate students have participated in the national workshop, and 30 local spin-off workshops have been organized in 10 different locations throughout the country. This year, ComSciCon is working to grow as a self-sustaining organization by transitioning to an independent 501(c)(3) non-profit. In this poster we will discuss the ComSciCon program and methods, our results to date, potential future collaborations between ComSciCon and professional societies, and how you can become involved.

Disclosures: A.L. Caldwell: None. **N. Sanders:** None. **M. Drout:** None. **S. Kohler:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.06SU/LLL59

Topic: J.03. Public Awareness of Neuroscience

Support: This study was supported by Department of Veterans Affairs (I01 RX002125).

Title: Combined stem cell factor and granulocyte colony-stimulating factor treatment enhances brain repair in the chronic phase of traumatic brain injury

Author: X. QIU[1], S. PING[2], M. KYLE[2], K. HUGHS[2], *L.-R. ZHAO[2]
[1]Neurosurg., [2]SUNY Upstate Med. Univ., Syracuse, NY

Abstract: Traumatic brain injury (TBI) is the leading cause of long-term disability among children and young adults in the United States. Evidence-based treatment for TBI recovery in the chronic phase is not yet available. Using a controlled cortical impact model of TBI in young adult mice, in the present study, we have determined the effects of the combination of stem cell factor (SCF) and granulocyte colony-stimulating factor (G-CSF) treatment on brain repair in the chronic phase of TBI. Three months after TBI, C57BL/6J mice were randomly divided into four groups: a vehicle control group, an SCF treatment group, a G-CSF treatment group, and an SCF+G-CSF treatment group. Age-matched mice without TBI served as sham controls. SCF and G-CSF were subcutaneously injected for 7 consecutive days. The findings of neurobehavioral tests at 3, 18, and 19 weeks post-TBI revealed that SCF+G-CSF treatment significantly improved recovery of TBI-induced impairments in spatial learning and memory (water maze test) and sensorimotor function (adhesive tape removal test), while SCF and G-CSF alone treatment did not lead to functionoal improvement. Twenty weeks after treatment, immunohistochemical assessment was performed. The results showed that GAP43 expressing neurons in the bilateral cortex were increased by SCF+G-CSF treatment when compared to TBI controls. The densities of SMI312 immunopositive axons and MAP2 immunopositive dendrites in the ipsilateral cortex were rebalanced in SCF+G-CSF-treated TBI mice. In the white matter, TBI-decreased axon density (SMI32 immunostaining) and TBI-reduced axonal myelination (MBP immunostaining) were significantly increased by SCF+G-CSF treatment, and the increases were greater than SCF or G-CSF alone treatment. In the ipsilateral CA1 of the hippocampus, TBI-induced over-generation of PSD95 immunopositive puncta was significantly reduced by SCF+G-CSF treatment.These findings suggest that combined SCF and G-CSF treatment in the chronic phase of TBI improves neurological function recovery and enhances neural network remodeling, axonal myelination, and synapse pruning. This study provides new insights into the contribution of hematopoietic growth factors, SCF and G-CSF, to brain repair in the chronic phase of TBI.

Disclosures: X. Qiu: None. **S. Ping:** None. **M. Kyle:** None. **K. Hughs:** None. **L. Zhao:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.07SU/LLL60

Topic: J.03. Public Awareness of Neuroscience

Title: Grey matters: A multimedia approach to accessible neuroscience

Author: *T. QIU[1], E. STEFANOU[2], P. BARTLETT[3], S. GU[3], T. GUO[3], G. WANG[3], A. CHEN[3]
[1]Psychology, Univ. of Washington, Seattle, WA; [2]Univ. of Washington, Pacific Grove, CA; [3]Univ. of Washington, Seattle, WA

Abstract: Grey Matters Journal is an undergraduate neuroscience journal at the University of Washington. For the past five years, working with a two-fold mission of education and outreach, Grey Matters has published and printed quarterly journals that are distributed to anyone interested in learning about neuroscience. Our journals are the result of collaborative, interdisciplinary work between undergraduate writers, artists, editors, and designers. A major part of our outreach involves our annual event, An Evening With Neuroscience (EWN), which attracts over 500 people from UW and the surrounding Seattle area each year. We are currently in the process of implementing a new online multimedia strategy to reach a wider audience and expand readership in ways that cannot be achieved through print distribution alone. The recent redesign of the Grey Matters website allows for consistent uploads of new articles as they are published. We now post individual articles that can be promoted on our social media to generate broader audience interest, allowing us to move to a subscription model for physical copies while ensuring our content remains widely accessible. In order to make our content even more accessible, Grey Matters has partnered with another group of undergraduate students to develop an app for the journal. The app will contain old and new Grey Matters articles for the public to read, allow readers to create profiles to bookmark and favorite content, and provide a platform for our podcast and video series. Additionally, a neuroscience glossary and information page on commonly used terms will be available for readers to reference. The app also provides another platform for Grey Matters to promote public events like EWN. Starting this year, we are releasing footage from EWN, which people can view after the event. A large part of our online strategy involves the creation of multimedia content, specifically podcasts and videos. The podcast and video series are based on article topics from our journal, providing a discussion-based explanation of the subject and interviews with experts. The podcast includes a segment where general readers can submit their questions to the researcher who is being interviewed on the topic. App users will thus be able to read, listen to, or watch neuroscience-related content and share it via social media. We believe the transition to other forms of neuroscience communication will help Grey Matters become a more sustainable organization. With the implementation of our new digital strategy and incorporation of multimedia content, Grey Matters will make neuroscience even more accessible to a larger audience.

Disclosures: T. Qiu: None. **E. Stefanou:** None. **P. Bartlett:** None. **S. Gu:** None. **T. Guo:** None. **G. Wang:** None. **A. Chen:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.08SU/LLL61

Topic: J.03. Public Awareness of Neuroscience

Title: Taste of science: A fest to feed your curiosity

Author: *B. E. SPENCER
UCSD, LA Jolla, CA

Abstract: taste of science is a national festival that takes place simultaneously in cities across the US. Since 2014, this annual festival has provided San Diegans a unique opportunity to get a flavor for the latest research by attending accessible science events in their favorite local hangouts. There are many great science festivals for children but far fewer such opportunities for adults. To bridge this gap, we've been bringing prominent local scientists to bars and cafes to share their expertise in an entertaining way. We encourage our scientist speakers to ditch their powerpoint slides in favor of props or demonstrations for events that are much more conversational and interactive than typical scientific lectures. Speakers have explained CRISPR genome editing entirely in song and rhyme, competed on behalf of their model organism for the title of Neuroscience's Next Top Model, and even created "mobile fMRI" light-up hats to demonstrate regional activation patterns. Our team of taste engineers is made up entirely of graduate students from UCSD and SDSU who manage our website and social media accounts, fundraise, and coordinate each event. We've collaborated with organizations that share our mission of making science accessible to everyone, such as NeuWriteSD and the Fleet Science Center. By providing plenty of time for discussion at our events, attendees can actually engage directly with the scientists themselves in a casual setting. We believe this humanizes scientists, fosters an appreciation for scientific research, and dispels skepticism. Together, this promotes the public perception of science and scientists themselves. Further, as scientists are called upon more and more to communicate their research to non-specialist audiences, taste of science offers a platform to hone this critical skill.

Disclosures:

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.09SU/MMM1

Topic: J.03. Public Awareness of Neuroscience

Support: NIAAA, P60AA011605

Title: Race your brain - An interactive exhibit for Brain Awareness Week

Author: *G. A. GOMEZ ACOSTA, J. BESHEER, D. L. ROBINSON
Bowles Ctr. for Alcohol Studies, Univ. of North Carolina At Chapel Hill, Chapel Hill, NC

Abstract: For Brain Awareness Week 2018, scientists from the UNC Bowles Center for Alcohol Studies organized an interactive exhibit "**Race Your Brain**!" as a platform for the community to

learn about how sensory information is used to control behavior. 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 which parts of the brain control movement, and how electrical signals transmit information from the brain to muscles quickly. Next, visitors entered a lab area for the "Race Your Brain" activity, in which they used a portable EMG unit (Backyard Brains, Ann Arbor, MI) attached to adhesive electrodes to visualize the muscle potentials from contacting forearm muscles. A Reaction Timer unit (Backyard Brains) and the Backyard Brains app allowed them to record muscle potentials in response to either sound or light stimuli. After recording a few trials, scientists helped the visitors to measure their reaction times to determine whether they were faster to an auditory or visual stimulus. Data from all of the visitors was compiled throughout the day and added to a composite graph in Microsoft Excel, projected on a prominent LCD screen in the lab space. Scientist volunteers were given detailed instructions on the activity and trained before their shift. The exhibit was staffed by 33 scientists and students. Approximately 375 children and 180 adults participated in the "Race Your Brain" activity over the 5 days (4-6 hr/day), with many more engaging with the brain exhibit. As this event was 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", PI: Fulton T. Crews).

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

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.10SU/MMM2

Topic: J.03. Public Awareness of Neuroscience

Support: Society of Neuroscience Chapter Grant

Title: Cultivating future generations of neuroscientists through brain awareness activities

Author: *A. N. NILSON[1,2], O. FOLORUNSO[3], G. TAGLIALATELA[4]
[2]Neurosci., [3]Pharmacol. and Toxicology, [4]Mitchell Ctr. for Neurodegenerative diseases, [1]Univ. of Texas Med. Br., Galveston, TX

Abstract: The Society for Neuroscience Galveston chapter fills a vital need for science outreach and mentorship in Galveston. Our goal is to foster scientific curiosity at the elementary, middle and high school levels, and to inspire them to choose careers in neuroscience and other health professions. Another goal is to reach under-resourced (Title I) schools that have limited access to educational extracurricular activities, and to expose underrepresented communities to higher education opportunities. Our strategy is to engage both the kids and their parents in an informal setting through annual brain fairs at the University of Texas Medical Branch in Galveston (UTMB), weekly farmer's market, class visits and visits to the Shriners Hospital for Children in Galveston. At the farmer's market, we have activities that appeal to kids of all ages ranging from coloring brain hats, neurons, and cartoon scientists to measuring EMGs from muscles. Each activity centers on a small topic such as the electrical activity of neurons and muscles. We host two annual brain fairs, one for middle and the other high school students, and over 170 students from multiple schools attend each fair. They are divided into small groups, and they rotate through different interactive stations such as brain anatomy, perception and illusion, traumatic brain injury and careers/college. They are able to see human/rodent/sheep brains, and we raise awareness about research done at UTMB to cure/treat brain disorders such as Alzheimer's disease, and addiction. Our recent post assessment surveys from 6th graders show that 75% learnt something new about the brain and 39% indicate an increased interest in science. Last year, we expanded our activities to Shriner's Burn Hospital and we put smiles on the kid's faces at the hospital through various activities like coloring brain hats and seeing brain slices under a microscope. Through these activities, SfN Galveston Chapter is addressing an important need in Galveston for science education and interest in science careers, and we are bridging the gap between scientists and the Galveston community by informing them about research at UTMB. To see all our activities and read about our organization please check out website www.sfngalveston.org.

Disclosures: A.N. Nilson: None. **O. Folorunso:** None. **G. Taglialatela:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.11SU/MMM3

Topic: J.03. Public Awareness of Neuroscience

Title: Accelerating our understanding of computerized cognitive training through the human cognition project

Author: *E. CORDELL, N. NG, R. SCHAFER
Res., Lumos Labs, San Francisco, CA

Abstract: Computerized cognitive training (CCT) is still a relatively new field, which makes it an exciting new space for insights and research. Furthering our understanding of the feasibility and efficacy of computerized cognitive training empowers us to characterize the benefits and limitations of cognitive interventions while simultaneously deepening our understanding of human cognition. However, several CCT research initiatives been tempered by methodological constraints such as difficulty obtaining access to customized cognitive training tools, insufficient sample sizes, low power, and incomparable task designs. The result is an unsystematic and fragmented body of CCT research literature, comprised of studies that are time consuming, costly, and difficult to replicate.
The Human Cognition Project (HCP) is an online platform created to facilitate large-scale, collaborative research studies, led by independent academicians and clinicians. The goal of the HCP is to advance our understanding of human cognition and computerized cognitive intervention by supporting research collaborators world-wide in their pursuit of efficiently conducting well-powered research initiatives. Inspired by Lumosity's web-based cognitive training platform, qualified research collaborators are granted fully-customized access to a suite of online cognitive training tasks, neuropsychological assessments, surveys, tracking metrics, and other research tools. Additionally, research collaborators have access to the largest database of human cognitive performance, with data from over 80 million individuals to date.
The HCP is guided by the hypothesis that bringing together a broad network of academic scientists and clinicians will accelerate our understanding of the feasibility and efficacy of computerized cognitive interventions in normal and disordered cognitive performance across the lifespan, thereby advancing the field of human cognition. Since the project formally began in 2011, HCP has resulted in twelve peer-reviewed publications. Here we will present an overview of the HCP platform as well as several primary findings from published studies that have resulted from the project.

Disclosures: E. Cordell: A. Employment/Salary (full or part-time):; Lumos Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Lumos Labs. **N. Ng:** A. Employment/Salary (full or part-time):; Lumos Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Lumos Labs. **R. Schafer:** A. Employment/Salary (full or part-time):; Lumos Labs. E. Ownership Interest (stock, stock options, royalty, receipt of intellectual property rights/patent holder, excluding diversified mutual funds); Lumos Labs.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.12SU/MMM4

Topic: J.03. Public Awareness of Neuroscience

Support: Sterns Family Foundation
Gorter Family Foundation

Title: Participation in multi-dimensional support based research program enhances low income Latinx high school students in the pursuit of higher education and STEM professions

Author: *M. K. LOH[1], J. RUIZ[2], H. RASGADO-FLORES[3]
[1]Dept. of Cell. and Mol. Pharmacol., [2]Div. of Student Affairs and Inclusion, [3]Dept. of Physiol. and Biophysics, Rosalind Franklin Univ. of Med. & Sci., North Chicago, IL

Abstract: The absence of Latinx representation in science, technology, engineering and mathematics (STEM) careers is most concerning. Currently, the Latinx community holds less than two-percent and six-percent of the STEM and healthcare workforce, respectively, yet is the largest growing minority group in the U.S. public school system. Programs focused on Latinx STEM representation are now key in meeting the demands of increasing STEM positions and diversifying STEM fields. Influence Student Potential and Increase Representation in Education (INSPIRE) is an eight-week applied research program designed to build a pipeline for Latinx students into STEM or healthcare fields. Competitive high school students from low-income and federally designated medically underserved areas in northern Lake County, IL are enrolled into the program following their sophomore year. Each student is then eligible to conduct biomedical research each summer at Rosalind Franklin University (RFU) until the completion of their undergraduate degree. The program provides a paid, multi-dimensional pipeline for students pursing STEM or healthcare careers. The INSPIRE curriculum includes daily biomedical-related courses, career development seminars, parental engagement, and hands-on experience working in biomedical research under the direction of a graduate student mentor and a faculty advisor. Additionally, 50% of INSPIRE scholars in 2017 were assigned to work on projects in RFU neuroscience-based laboratories. The program yielded 100% matriculation rate of INSPIRE participants into a two- or four-year higher education institutions upon high school graduation, a statistic almost twice as high as their non-INSPIRE participating high school peers. In addition, at the completion of the 2017 internship term, all students indicated their intent or current pursuit of a career in STEM or healthcare.

Disclosures: M.K. Loh: None. **J. Ruiz:** None. **H. Rasgado-Flores:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.13SU/MMM5

Topic: J.03. Public Awareness of Neuroscience

Support: DGAPA-PAPIIT IN306918

PAPIME PE306318

Title: Use of social networks in science forums

Author: *P. TORRES-CARRILLO[1], M. D. VERGEL-MUNGUÍA[2], D. B. PAZ-TREJO[3], H. SANCHEZ-CASTILLO[4]
[1]Lab. de Neuropsicofarmacologia y Estimacion Temporal, Univ. Nacional Autonoma De Mexico, Ciudad de Mexico, Mexico; [2]UNAM, Facultad De Psicología, Ciudad DE Mexico, Mexico; [3]Univ. Nacional Autonoma de Mexico, Mexico City, Mexico; [4]Univ. Nacional Autonoma De Mexico. Fac Psicologia, Mexico City, Mexico

Abstract: The social network has opened multiple windows for all genres of self-expression and social interaction. This new technologies could support meaningful educational experiences and encourage knowledge acquisition. The integration of it in higher education appears to have a positive impact. The participation in social networks may enhance interaction between people with similar interest and enrich the learning experience. The same way can lead building a network were all can work collaboratively and generate an environment where the knowledge could be shared. In many times, discuss, dissemination and, shared knowledge face-to-face is complicated. The use of social networks for sharing science knowledge appears AS a strategy to share it with the whole world. For above, the aim was use of social network can increase online attendance and thus the dissemination of science information in a science and awareness forum. The inclusion of awareness activities allowed the attendance of people non-specialized and people with another background, non-necessarily neuroscience. That can get closed the boundaries of scientific and non-specialized people. In the same way, social networks allowed the participation of the people from another neuroscience fields and institutions; this academic diversity also providing an interdisciplinary neuroscience communication and also made possible showed to people the diversity approaches in neuroscience research. In conclusion, as a communication tool, social network effectiveness is already manifesting in the millions who use these networks to communicate in a daily basis and they were applied as strategy to promote the dissemination of scientific knowledge and inclusion of non-specialized people in this kind of forums.

Disclosures: P. Torres-Carrillo: None. **M.D. Vergel-Munguía:** None. **D.B. Paz-Trejo:** None. **H. Sanchez-Castillo:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.14SU/MMM6

Topic: J.03. Public Awareness of Neuroscience

Title: The search for 3D printable bioinks by community biology labs

Author: *D. FOSTER[1], H. KIM[2], R. LEE[3], J. KOO[4], K. FOSTER[5], R. JOHNSON[6], B. TENG[7]
[1]C/O Thelab Inc. /www.thel4b.com, Los Angeles, CA; [2]Stanford, Palo Alto, CA; [3]TheLab Inc., Los Angeles, CA; [4]TheLab Inc, Los Angeles, CA; [5]Biol., Californiia State University, Fullerton, Fullerton, CA; [6]Pathology & Lab. Med., UCLA, Los Angelesis, CA; [7]Biol., California State Univ. Northridge, Northridge, CA

Abstract: The state of bioprinting is at present intimately tied to the properties of existing bioinks. The term bioink has been variously defined, but in general refers to cell friendly substances that can be used by modified 3D printers to create living tissue via additive manufacturing. A promising bioink candidate consisting of sodium alginate, gellan, seawater, and egg white has been formulated at a community lab. Tests have shown that viscosity, tensile strength, and density are bioink properties that can be manipulated and that affect the ability of cell-laden forms that to maintain their shape. A low budget jig has been created to quantify the aforementioned qualities. We are using bacteria and invertebrate cells to test the efficacy of potential bioinks. Progress in printing these cell types should broadly transfer to printing other cell and tissue types, including nervous tissue. The materials we are using are readily available and allow us to bring an emerging technology to the public at large. We hope to and create situations that could lead to innovations from unconventional sources.

Disclosures: D. Foster: None. **H. Kim:** None. **R. Lee:** None. **J. Koo:** None. **K. Foster:** None. **R. Johnson:** None. **B. Teng:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.15SU/MMM7

Topic: J.03. Public Awareness of Neuroscience

Title: NIH contributions to the BRAIN Initiative

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Abstract: The **B**rain **R**esearch through **A**dvancing **I**nnovative **N**eurotechnologies (**BRAIN**) Initiative® aims to revolutionize our understanding of the human brain by accelerating the development and application of innovative neurotechnologies. The National Institutes of Health (NIH) collaborates with multiple U.S. federal and non-federal partners who are invested in the Initiative, as well as international groups. To guide NIH, a BRAIN Working Group of the

Advisory Committee to the NIH Director (ACD) developed "***BRAIN 2025: A Scientific Vision***." A roadmap to reach the long-term goals of BRAIN at NIH, *BRAIN 2025* focuses on seven scientific priority areas involving mapping the circuits of the brain, measuring the fluctuating patterns of electrical and chemical activity flowing within those circuits, and understanding how their interplay creates cognitive and behavioral capabilities. As the Initiative rapidly approaches its halfway point, **a new ACD BRAIN Initiative Working Group** will assess BRAIN's progress and advances within the context of the *BRAIN 2025* report, identify key opportunities to apply new and emerging tools to revolutionize our understanding of brain circuits, and designate valuable areas of continued technology development. The NIH BRAIN Multi-Council Working Group (MCWG) provides external scientific input and guidance for on-going research programs, and its Neuroethics Division serves as a resource to help navigate ethical issues associated with BRAIN research.

NIH facilitates regular interactions and collaborations across various BRAIN stakeholders by hosting an **annual Investigators Meeting**, participating in the **BRAIN Initiative Alliance** (BIA), including supporting BIA's annual public satellite event at SfN, and by participation of its BRAIN leadership and programmatic staff at interdisciplinary scientific meetings.

BRAIN Funding Opportunity Announcements emerge after careful consideration of the recommendations of the *BRAIN 2025* report, input from the MCWG, and iterative discussions by trans-NIH staff and leadership. As the Initiative enters its fifth year, NIH has supported **over 500 principal investigators**, who have answered the Initiative's challenge via hundreds of publications describing novel tools, methods, and discoveries that address the Initiative's seven scientific priorities. This poster highlights **scientific advancements, funding opportunities, and the myriad partnerships that constitute NIH's contribution to BRAIN**. Additional details and updates on funding opportunities and events related to the NIH BRAIN Initiative are routinely published on the website: **www.braininitiative.nih.gov**.

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

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.16SU/MMM8

Topic: J.03. Public Awareness of Neuroscience

Support: Maestría y doctorado en Neuroetología, Universidad Veracruzana
Doctorado en Ciencias Biomédicas, Universidad Veracruzana

Title: Educating responsible citizens that recognize the importance of neuroscience

Author: *R. C. ZEPEDA[1], C. J. JUÁREZ-PORTILLA[1], M. A. MELGAREJO[3], A. PUGA[4], D. HERNÁNDEZ[4], Á. PAVÓN ROSADO[2], J. CUETO-ESCOBEDO[4], M. ALVARADO-OLIVARES[4], T. MOLINA-JUMÉNEZ[5], J. F. RODRÍGUEZ-LANDA[4], L. T. HERNÁNDEZ[4], B. BERNAL[4], J. MORALES-MAVIL[4], M. D. ROVIROSA[4], A. CORTÉS-SOL[6], C. CEBALLOS-POMARES[7], M. D. CABA[7], A. CORNEJO[7], S. RUFINO-CUÉLLAR[7], M. HERNÁNDEZ[7], L. SERRANO-MARUQEZ[7], F. VÁZQUEZ-ORTEGA[7], E. MEZA[8]
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Abstract: The research of the brain and nervous system has improved the knowledge about the normal and pathological function of this system among scientists from the entire world. However, in recent years, the teaching and dissemination of the study of the brain has become important, since different sectors of society have shown an increase interest in this topic for a better understanding of some brain diseases. Therefore, since 2014, each year, academics, researchers, under and graduate students, that work at the Biomedical Research Center, the Institute of Neuroethology, the Medicine School, and the faculties of Biology and Chemistry of the Universidad Veracruzana, participate all together to create workshops and lectures to communicate their experiences and knowledge in the field of neuroscience. This year, we visited 3 kinder gardens and 7 high schools, where we gave brain fairs, lectures, and workshops. Moreover, we discuss neuroscience topics through informal lectures in a theater-coffee shop, and an art gallery.

Disclosures: R.C. Zepeda: None. **C.J. Juárez-Portilla:** None. **M.A. Melgarejo:** None. **A. Puga:** None. **D. Hernández:** None. **Á. Pavón Rosado:** None. **J. Cueto-Escobedo:** None. **M. Alvarado-Olivares:** None. **T. Molina-Juménez:** None. **J.F. Rodríguez-Landa:** None. **L.T. Hernández:** None. **B. Bernal:** None. **J. Morales-Mavil:** None. **M.D. Rovirosa:** None. **A. Cortés-Sol:** None. **C. Ceballos-Pomares:** None. **M.D. Caba:** None. **A. Cornejo:** None. **S. Rufino-Cuéllar:** None. **M. Hernández:** None. **L. Serrano-Maruqez:** None. **F. Vázquez-Ortega:** None. **E. Meza:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.17SU/MMM9

Topic: J.03. Public Awareness of Neuroscience

Support: Penn State University Brain Repair Research Fund

Ron and Pratima Gatehouse Trust Fund
Anne and Phillip Glatfelter III Family Foundation

Title: Promoting neuroscience awareness among Central Pennsylvania youth leads to career selection in the neurosciences

Author: *K. VENKITESWARAN, S. RAVI, A. R. WHITE, E. BLANKE, E. MADAR, Y. KIM, A. BARBER, T. SUBRAMANIAN
Penn State Col. of Med., Hershey, PA

Abstract: The regional chapter of SfN in the Central Pennsylvania region comprises geographic area, which includes Susquehanna River Valley, Cumberland Valley, Happy Valley and South Central Pennsylvania. Although this chapter was present prior to 2006, there was not many events and contests to promote neuroscience among the high school students. The chapter leadership was dormant. In 2006, Dr. Subramanian, took over the leadership and activated yearly brain awareness programs and designated a Brain Bee officer, Dr. Venkiteswaran to engage maximum participation of youth. We also instituted a yearly neuroscience poster review and a grass foundation lecture. We created a unique Brain Bee competition format that consists of a written exam, a laboratory practical exam involving human brain specimens and a clinical vignette charade session. To allow peer interaction, we included the neuroscience graduate students to lead the lab session and medical students interested in neurology to lead the clinical vignette session. Top 10 placed youth in the Brain Bee are offered a free 10-week summer internship and research immersion at Penn State College of Medicine focused on Parkinson's disease and related disorders. In addition, external students beyond central PA who applied for our internship were required to take the written test and place above the 90^{th} percentile of our regional competition. We have on an average 35 competitors each year and we have had a total of 80 summer Brain Bee interns. Fifty percent of our graduates are have chosen one of the biological sciences as their undergraduate major. To further incentivize the interns we began offering free enrolment into an introductory undergraduate neurobiology course with laboratory component lead by Dr. Subramanian. We have also partnered with local schools to increase diversity of summer internship and brain bee participants. In collaboration with Milton Hershey School, we have successfully included a larger representation of historically underrepresented population in both programs. This school in turn has allowed us to hold our annual Brain Run 5K fund raiser to support the summer internship. In recognition of our efforts and to continue meaningful engagement of our alumni in the neurosciences, we received recently grant support from Anne and Phillip Glatfelter III family foundation. Further, our model of the brain bee competition as a portal for summer internship and community engagement in the neurosciences has now been replicated successfully by one of our graduate student alumni at Hofstra University. Our program could serve as model for nationwide youth engagement in neurosciences and careers in the neurosciences.

Disclosures: S. Ravi: None. **A.R. White:** None. **E. Blanke:** None. **E. Madar:** None. **Y. Kim:** None. **A. Barber:** None. **T. Subramanian:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.18SU/MMM10

Topic: J.03. Public Awareness of Neuroscience

Support: Quinnipiac University

Title: The 31st northeast under/graduate research organization for neuroscience (NEURON) conference held at Quinnipiac University in Hamden, CT

Author: *A. J. BETZ[1], A. TODD[1], V. FRANCONE[2], A. C. BASU[3], J. G. TRAPANI[4], C. A. FRYE[5], J. D. SALAMONE[6]
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Abstract: The 31st NEURON conference was held on February 25th, 2018, at Quinnipiac University's Center for Medicine, Nursing and Health Sciences. Quinnipiac now hosts the website for the NEURON conferences, which includes registration, abstract submission, archives of previous talks, resource links, and image galleries (www.quinnipiac.edu/neuron). The 2018 keynote speaker was Dr. John Salamone, Board of Trustees Distinguished Professor, University of Connecticut. His talk was titled *Probing the Neurochemistry of Motivational Dysfunction in Depression and Other Disorders: Studies with Animal Models*. Dr. Salamone's laboratory examines the neurobiological basis and mechanisms that underlie the effort-related functions of dopamine and other neuromodulators. Specifically his studies are related to animal models of depression, motivation, effort-related decision making, and drug-induced Parkinsonism. His research group uses multiple methodological approaches, including *in vivo* electrochemistry and behavioral pharmacology. At the conference, students and faculty participated in four workshops, including: Careers in science panel; How to Make a Scientific Poster, (Re)building Healthy Brains, Advocating for Neuroscience, and Intraoperative Neurophysiological Monitoring. The Tieman and Frye awards were given to students to honor the quality of their work and poster presentations. For the third year, NEURON has partnered with *Nu Rho Psi*, the national neuroscience honor society, which offered a third student poster award. NEURON 2018 grew representing over 40 different institutions and 8 states.. With continued local and regional support from faculty dedicated to student outreach and mentorship, NEURON has continued to expand beyond its original Boston locations to include greater representation from the northeast region.

Disclosures: A.J. Betz: None. **A. Todd:** None. **V. Francone:** None. **A.C. Basu:** None. **J.G. Trapani:** None. **C.A. Frye:** None. **J.D. Salamone:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.19SU/MMM11

Topic: J.03. Public Awareness of Neuroscience

Support: SfN Chapter Grant

Title: NeuWriteSD: Building skills in science communication through writing

Author: *M. ROSSA[1], J. LOVELETT[2], D. SCHREINER[2], B. SPENCER[1], M. KIRCHGESSNER[1]
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Abstract: While scientists are frequently called upon to express their ideas and results to other scientists through writing (specifically peer-reviewed publications and grants), they are rarely given training in writing for audiences outside of their immediate field. This is an increasingly vital skill, as public misconceptions of the goals and outcomes of research funding abound and skepticism of scientific findings persists. NeuWriteSD is an organization run entirely by UCSD graduate students with the goals of: a) publishing blog-style posts on various topics and issues in neuroscience that are accessible to a general audience; b) providing training in effective and engaging writing for non-neuroscientist audiences; and c) offering resources and support for individuals hoping to pursue careers in science writing and other forms of science communication. Since its inception five years ago, NeuWriteSD has maintained an active blog (neuwritesd.org), publishing weekly articles on a variety of neuroscience topics that reach thousands of viewers around the world. The organization has also produced an bi-annual print edition - “The NeuWrite Times” - which can be more easily distributed at local events and venues. The organization also pursues other general science communication endeavors through collaborations with local organizations (e.g., taste of science SD, ComSciConSD) and plans to host its own public events exploring other creative means of communication (e.g., through art, storytelling, etc.). Though initially begun as an organization within the UCSD Neurosciences Graduate Program, NeuWriteSD has grown to include writers from graduate programs in psychology, cognitive sciences, biomedical sciences, and more who share a common fascination with the brain and an interest in written communication. In addition to its biweekly meetings in which members offer feedback on upcoming articles, the organization has also hosted a number of workshops for members and non-members alike on topics such as how to effectively use graphics for science communication and how to pitch articles to potential publishers. Many of our past contributors have gone on to jobs in research, communication, and policy and credit NeuWriteSD with helping them develop communication skills that are vital for their careers. NeuWriteSD could serve as a model for other graduate programs and institutions whose members wish to improve their written communication skills and are passionate about sharing their interests in neuroscience with the general public.

Disclosures: M. Rossa: None. **J. Lovelett:** None. **D. Schreiner:** None. **B. Spencer:** None. **M. Kirchgessner:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.20SU/MMM12

Topic: J.03. Public Awareness of Neuroscience

Title: The 2018 united states regional brain bee championship

Author: *D. A. SEMINOWICZ[1], N. R. MYSLINSKI[2]
[1]Dept of Neural & Pain Sci., Univ. of Maryland, Baltimore, Baltimore, MD; [2]Neural and Pain Sciences, 8th floor, Univ. of Maryland Dent. Sch., Baltimore, MD

Abstract: The Brain Bee is a neuroscience competition for teenage students. After three days of intense competition, the 2018 USA Regional Brain Bee Champion is **Akhil Kondepudi,** a Junior at Ladue Horton Watkins High School. The event is sponsored by the **Department of Neural and Pain Sciences of the University of Maryland School of Dentistry.** Fifty-four Chapter winners from 37 states competed in March, 2018. He won a scholarship, a summer internship at a neuroscience lab, and the right to represent the USA at the Twentieth **International Brain Bee (IBB) Championship in Berlin, Germany** where he will compete against the regional champions from approximately 27 countries such as **Australia, Brazil, Canada, China, Germany, India, Iran, Israel, Italy, Japan, Korea, Malaysia, Nepal, New Zealand, Nigeria, Poland, Romania, Singapore, South Africa, Ukraine, United Arab Emirates and others.** The 2018 IBB Championship is hosted by the **Federation of European Neuroscience Societies.** 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, brain histology, and a final question-and-answer component. To advance to the USA Regional Championship, Akhil won the St. Louis, Missouri, Chapter competition that is coordinated by **Erik Herzog** of Washington University. Second place went to **Hemanth Asirvatham of Minneapolis, Minnesota**. Third place went to **Sehej Bindra of Piscataway, New Jersey**. **Colin Wood from Worcester, Massachusetts** came in fourth; **Sneha Shinde from Rootstown, Ohio** came in fifth; **Aayush Setty from Atlanta, Georgia** came in sixth; **Lasya Kambhampati from Kansas City, Kansas** came in seventh; **Veda Chanda from Hershey, Pennsylvania** came in eighth; **Sarah Shirley from Little Rock, Arkansas** came in ninth; and **Jessica Goldstein from Hempstead, New York** came in tenth. The USA Regional Brain Bee was founded by **Dr. Norbert Myslinski,** and one of 50 Official Regional Brain Bees of the **International Brain Bee** which is lead by a Board of Directors 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, "Its 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. **Dr. Myslinski was the SfN 2016 Science Educator of the Year.**

Disclosures: D.A. Seminowicz: None. **N.R. Myslinski:** None.

Theme J Poster

026. Public Awareness of Neuroscience: Outreach Activities I

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 026.21SU/MMM13

Topic: J.03. Public Awareness of Neuroscience

Title: NeuroBoricuas: Inception of University Chapters to increase neuroscience education in colleges and K-12 schools

Author: *M. I. DE JESÚS-BURGOS[1], M. DIAZ-RIVERA[2], B. SANTOS-VERA[3], Y. FERRER-ACOSTA[4], M. P. MENDEZ-GONZÁLEZ[5], D. REYES-COLÓN[6], L. C. VICENTE-RODRÍGUEZ[2], J. SANTIAGO[7], C. BRAVO-RIVERA[8]
[1]Biol., Univ. of Puerto Rico, Cayey Campus, Cayey, PR; [2]Anat., Univ. of Puerto Rico Sch. of Med., San Juan, PR; [3]Dept. of Basic Sciences, Neurosci. Div., Ponce Hlth. Sci. University-School of Med., Ponce, PR; [4]Neurosci., Univ. Central del Caribe, Bayamon, PR; [5]Biol., Univ. of Puerto Rico, Aguadilla, PR; [6]Biol., Univ. of Puerto Rico, Arecibo, PR; [7]Psychology, Univ. of Puerto Rico, Mayaguez, PR; [8]Cold Spring Harbor Lab., Cold Spring Harbor, NY

Abstract: Puerto Rico is in dire need of transforming its education system to counter the current economic recession and ensure a future with talented Puerto Ricans at the forefront of scientific research and technology development. Here we present a group of neuroscientists and educators, the NeuroBoricuas, committed to revolutionize the scientific culture of Puerto Rico by incorporating neuroscience research training and inquiry-based activities in public and private schools. In our current phase, we started to implement NeuroBoricuas University Chapters. These chapters are led by undergraduate students, where they create a network of support that enhance their exposure to research opportunities. These students organize neuroscience outreach activities for other undergraduate and school students, organize neuroscience talks in their institutions, and train new members to participate in neuroscience teaching. These students are supported by NeuroBoricuas faculty members, which serve as facilitators and mentors. These Chapters help student find research opportunities and help faculty find motivated members for their research laboratories. In these Chapters, students also learn how to mentor, such that more senior students serve as counselors to more junior students. Moreover, students from these

Chapters can serve as mentors for high school students engaging in scientific fair projects. A main goal of NeuroBoricuas is to implement neuroscience laboratories in schools of Puerto Rico, using equipment from Backyard Brains. Students from University Chapters are key in the training of school teachers in the use of their laboratory equipment. By empowering high school students to engage in research early on, and fostering research skills in college students, NeuroBoricuas helps set a path for a prosperous scientific culture in Puerto Rico.

Disclosures: M.I. De Jesús-Burgos: None. **M. Diaz-Rivera:** None. **B. Santos-Vera:** None. **Y. Ferrer-Acosta:** None. **M.P. Mendez-González:** None. **D. Reyes-Colón:** None. **L.C. Vicente-Rodríguez:** None. **J. Santiago:** None. **C. Bravo-Rivera:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.01SU/MMM14

Topic: J.03. Public Awareness of Neuroscience

Support: NSERC

Title: Comic book representation of Batman and brain injury across the years

Author: *H. MUSTAFA, A. HARRISON, H. CULLEN, S. BLACK, B. WRIGHT, E. P. ZEHR
Univ. of Victoria, Victoria, BC, Canada

Abstract: Public health awareness of concussion continues to grow along with interest in extreme human ability as embodied in comic book superheroes. These two outcomes could be in opposition since there are several inaccurate representations of the recovery process as shown in the life of Batman (Zehr, 2008). Previously we noted extreme levels of concussion exposures shown for Batman in his movie career (Zehr & Wright, 2016). Here we examined concussive events experienced by Batman from direct head trauma or bodily impact as depicted in comic books from 1943 to the 2016 using analysis techniques adapted from those used in sports. Three key parameters involved interpretation of concussive signs (unresponsive, clutching head, gait unsteadiness, vacant stare and/or possible seizure), authors/illustrators directly reporting the events, and the timing of the recovery process.
From the 62 editions of Batman comics reviewed, there were over 200 exposures and 26 reported incidences of concussion experienced by the Caped Crusader. The data were normalized by number of pages and the greatest occurrences of concussive exposures were in the Batman comics of the 1960s. It was also noted that the highest impact source for exposures were collisions and fights, while the reported incidences were mainly owing to fights in the comic books.
Although the research is based on the fictional character Batman, his mythology is pitched on

him being a human being. Thus it is important to reflect on the portrayal of Batman and brain injury in pop culture. Batman is knocked unconscious more frequently in earlier years but his recoveries are very quick - “moments later” or “later that night”. This poses concern because the awareness of these events is distorted and reinforces misunderstanding of concussion and the recovery process. It is our hope that as public awareness of signs and symptoms of brain injury increases so will the accurate depictions in pop culture. In fact, they can be mutually supportive. There is nothing wrong—and almost everything right--with showing a Caped Crusader who’s aware of concussion and works to mitigate the effects of mild traumatic brain injury.

References:
Zehr, E. P. (2008). *Becoming batman: The possibility of a superhero*. Baltimore: Johns Hopkins University Press.
Zehr, E. P., & Wright, B. (2016). Can concussion constrain the caped crusader? *British Journal of Sports Medicine, 50*(23), 1481-1484. doi:10.1136/bjsports-2016-096792.

Disclosures: H. Mustafa: None. **A. Harrison:** None. **H. Cullen:** None. **S. Black:** None. **B. Wright:** None. **E.P. Zehr:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.02SU/MMM15

Topic: J.03. Public Awareness of Neuroscience

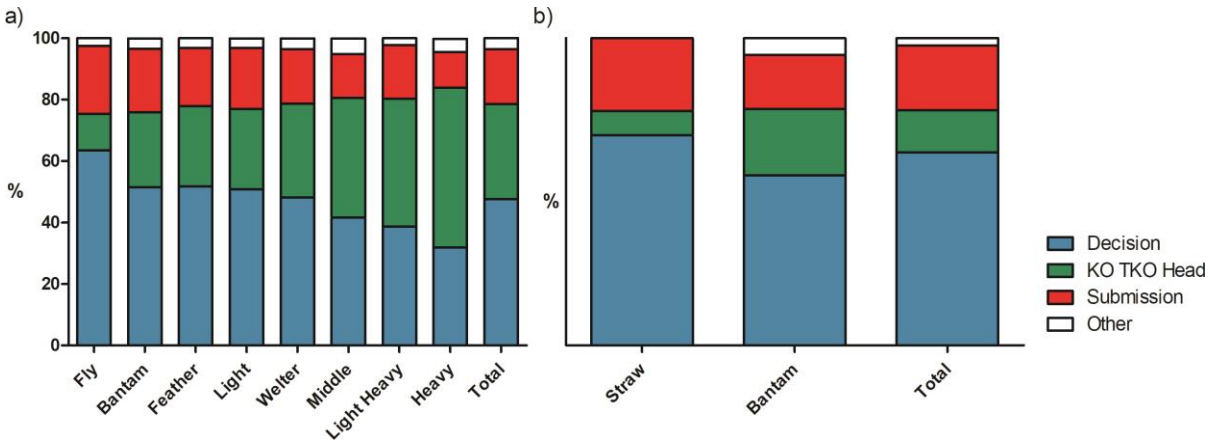
Support: NSERC

Title: Portrayal of concussion exposure in mixed martial arts: review and analysis of fight outcomes and head trauma risk according to gender and weight class

Author: *B. FOLLMER[1,2], R. A. DELLAGRANA[2], E. ZEHR[3]
[1]Univ. of Victoria, Victoria, BC, Canada; [2]Lab. of Biomechanics, Federal Univ. of Santa Catarina, Florianópolis, Brazil; [3]Rehab Neurosci. Lab., Victoria, BC, Canada

Abstract: Brain injury arising from head trauma is a major concern in Mixed Martial Arts (MMA) because knockout (KO) and technical knockout (TKO) are frequent fight outcomes. Previous studies showed high incidence of match-ending due to strikes to the head but did not include and analyze weight categories and female fights. The aim of the present study was to perform an analysis concerning match stoppages in MMA and the incidence of head trauma distinguished by gender and weight categories. A total of 167 events from 1854 fights (8 male and 2 female weight categories) between 2014 and 2017 were assessed. Each fight outcome was obtained from a specialized, publicly accessible website. Odds ratios were calculated comparing weight classes according to the chance of a KO/TKO stoppage by strikes to the head. A stoppage

via KO/TKO occurred in 7.9% combats of the female strawweight division, and in 52.1% of the male heavyweight fights (Figure 1a male; 1b female). Regardless of the weight category, the KO and the combined KO/TKO rates were 6.68 and 15.45 per 100 athlete-exposure, respectively. However, the KO/TKO incidence in the middleweight (19.53), light heavyweight (20.8) and heavyweight (26.09) divisions were higher than previously reported for MMA. The male flyweight presented a significantly diminished (OR, 0.38; 95% CI, 0.21-0.68) chance of a KO and/or TKO due to strikes to the head, whereas the middleweight (OR, 1.80; 95% CI, 1.26-2.56), light heavyweight (OR, 2.00; 95% CI, 1.32-3.03) and heavyweight (OR, 3.06; 95% CI, 2.03-4.61) increased the risk. The female bantamweight category presented significantly increased risk (OR, 3.21; 95% CI, 1.29-7.97) compared to the strawweight. Punches were widely used to end combats by males (75%) and females (58.3) regardless of weight division. Both gender and weight category must be considered for study and evaluation of head injury risk in MMA since the greater the body mass the higher is the percentage of stoppages by KO and TKO. MMA fights as currently shown support the misperception in popular culture that head impacts are trivial.



Disclosures: B. Follmer: None. **R.A. Dellagrana:** None. **E. Zehr:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.03SU/MMM16

Topic: J.03. Public Awareness of Neuroscience

Support: NIH/NIA AG027544
NIH/NIA AG00538
AG 96-34

Title: REMIND: Bridging the gap between neuroscience and children

Author: *A. CADETE MARTINI, S. FORNER, S. E. ROYER, C. G. COX, K. M. KLEIN, J. D. GRILL
UCI MIND, Univ. of California Irvine, Irvine, CA

Abstract: Research and Education in Memory Impairments and Neurological Disorders, or REMIND, is a campus organization led by UCI MIND predoctoral and postdoctoral trainees that aims to encourage collaboration among the next generation of scientists and clinicians and to promote community outreach and education on neurodegenerative diseases. We use fun, interactive activities and demonstrations to increase the community awareness of the healthy and diseased brain. Through this initiative, REMIND trainees have led brain education workshops for over 300 middle and high school students in Orange County, CA. Every year, REMIND holds an "Emerging Scientist Symposium" where predoctoral and postdoctoral trainees in neurodegenerative diseases research at UCI have the opportunity to present their work to faculty, staff, and students. The event includes invited trainee presentations, poster competitions and awards, and distinguished speakers from across the country. REMIND is also an active member of the UCI STEAM Outreach Council, an initiative led by the Beall Center for Art and Technology that aims to engage K-12 students from local under-resourced public schools in science, technology, engineering, art and mathematics. The goal of this collaboration is to expose the students to the exciting field of neuroscience research and inspire them to pursue higher education in STEAM fields.

Disclosures: A. Cadete Martini: None. **S. Forner:** None. **S.E. Royer:** None. **C.G. Cox:** None. **K.M. Klein:** None. **J.D. Grill:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.04SU/MMM17

Topic: J.03. Public Awareness of Neuroscience

Title: Neuro club + TORCH: Brain awareness activities with under-served middle school students

Author: H. H. MOHAMED[1], P. J. BROWNELL[2], L. M. CARLSON[1], *S. D. DICKINSON[1]
[1]Psychology and Neurosci. Program, [2]Neurosci. Program, St. Olaf Col., Northfield, MN

Abstract: Brain Awareness Week is a national campaign by the Dana Foundation that aims at teaching students about neuroscience. The St. Olaf College Neuro Club, a neuroscience interest student organization on campus, organized a local Brain Awareness Day at the Northfield Middle School for Brain Awareness Week. This year, our goal was to expose younger and underserved students to the field of neuroscience. We collaborated with Northfield's Tackling

Obstacles & Raising College Hopes (TORCH,) a local college readiness program for students of color, as well as low-income and first-generation students. We worked with students grades six through eight at the Northfield Middle School afterschool program for TORCH students at the Northfield Youth Center. Our objective for Brain Awareness Day was to teach students about the brain, its anatomy, and its functions, as well as its ailments. We organized five stations that would discuss these objectives in a creative and interactive manner. The students rotated throughout the stations in different classrooms, spending about 15 minutes at each station. In the memory station the students learned about the stages of memory and memorization techniques, such as chunking and mnemonics, and they tested their memory with an image matching game along with rebus puzzles. In the anatomy room, the students built a neuron from candy pieces and learned about how the nervous system functions, in addition to how the neuron works. To learn about brain anatomy pertaining to the senses, students colored in the relevant area after they learned about different parts of the brain associated with a sense. To explore sensory interactions, students learned about the Stroop effect and performed Stroop tests, and then conducted blind tasting of jelly beans to test their ability to taste without sight. We ended Brain Awareness Day with outdoor brain games with the students. In total, we had nine student volunteers from Neuro Club, 28 middle school students, and seven Northfield Youth Center staff volunteers. The middle school students and Youth Center staff were thrilled about the Brain Awareness activities. The Youth Center Coordinator praised the student volunteers for their delivery of information, engagement with the students, and their exceptional ability to connect with the middle school youth. Neuro Club hopes to continue community engagement in neuroscience outreach and bridge the gap in educating underserved students in our local community.

Disclosures: H.H. Mohamed: None. **P.J. Brownell:** None. **L.M. Carlson:** None. **S.D. Dickinson:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.05SU/MMM18

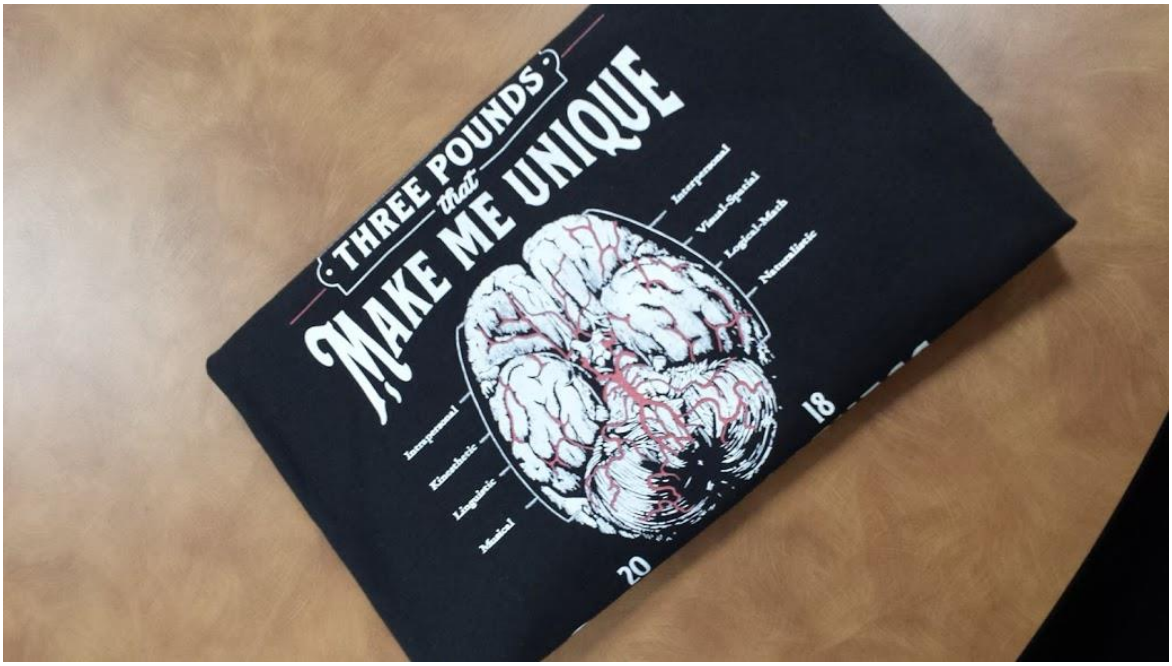
Topic: J.03. Public Awareness of Neuroscience

Title: Are we at 3 pounds yet? Teaching young children about the brain

Author: *R. WILLIAMSMORRIS[1], M. L. THOMAS[2], Z. L. SISCO, 37315[3]
[1]Psychology, Southern Adventist Univ., ooltewah, TN; [2]Psychology, Southern Adventist Univ., Collegedale, TN; [3]Psychology, Southern Adventist Univ., collegedale, TN

Abstract: For Brain Awareness Week, 2018, we designed an outreach activity to introduce young children attending a local daycare center to the brain and nervous system. In southeast

Tennessee, we were aware of programs during that week for school-aged children, but none that specifically targeted young children between the ages of 2.5 to 4 years of age. For two days during Brain Awareness Week 2018, we visited a local daycare center and put on a 30-minute developmentally appropriate program teaching the children about the brain. Students from a local university assisted in presenting the program. Activities included learning action brain songs that listed major brain anatomy and making brain hats of each child. Twenty-four preschoolers participated in the program. Plans are to expand this program next year to other daycare centers in the area.



Disclosures: R. Williamsmorris: None. **M.L. Thomas:** None. **Z.L. Sisco:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.06SU/MMM19

Topic: J.03. Public Awareness of Neuroscience

Title: BrainStation: Brain science in the elementary school classroom

Author: *A. I. MORE[1], J. J. STEIN[1], A. C. TSUDA[1], J. L. BASSELL[2], S. T. MERNOFF[3]
[1]Brown Univ. Neurosci., Brown Univ., Providence, RI; [2]Alpert Med. Sch., Providence, RI; [3]Providence Veterans Affairs Med. Ctr., Providence, RI

Abstract: BrainStation's mission is to increase awareness of the brain, mental illness, and neurological disorders systematically by educating children during the earliest years of elementary school. BrainStation provides free student-development workshops to elementary schools in Rhode Island, and this brain science outreach is led by medical student and graduate student volunteers from Brown University. BrainStation addresses the study of the nervous system with the idea that teaching children about the brain during their early development will help them to understand how the brain functions properly and will help to reduce stigmas and biases associated with mental illness and neurological disorders. BrainStation is based in Providence, RI and its curriculum incorporates education goals promoted by the Rhode Island Department of Education in its Next Generation Science Standards.
Brown University neuroscience graduate student, Alex Ian More, neuroscientist Dr. John Stein, and neurologist Dr. Stephen Mernoff developed BrainStation to bring this interactive, intriguing, and valuable study to students during their first years of school. BrainStation was formed in July 2016 with the initial goal of addressing the stigma of mental illness. Rates of mental illness and neurological disorders are higher than ever, and according to the National Institutes of Health, roughly 43 million Americans suffer from a mental disorder. Biases are often reported by those suffering from mental illness and neurological disorders, and these factors can have overwhelming effects on those coping with these stigmas. A systematic educational program such as BrainStation is an opportunity to provide an educational platform to inspire young students with the potential of brain science. It also establishes a foundation for medical students and graduate students to receive teaching experience and promotes interaction between Brown University and the larger community in which it functions.
In its first two years BrainStation reached over 20 elementary schools and 1,300 students in Rhode Island and it has generated a rapport with several elementary schools, leading to multiple return visits. BrainStation participated in the Brown Brain Fair in March 2017 and 2018 during Brain Week Rhode Island, where it partnered with more schools throughout the community. In its third year, BrainStation will continue to expand state-wide and regionally to continue the effort to mentor and educate children in brain science fields. It will also seek federal and private financing during its third year to fund these goals.

Disclosures: J.J. Stein: None. **A.C. Tsuda:** None. **J.L. Bassell:** None. **S.T. Mernoff:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.07SU/MMM20

Topic: J.03. Public Awareness of Neuroscience

Support: Shirley and Stefan Hatos Center for Neuropharmacology, UCLA
Brain Research Institute, UCLA

Title: Drug Outreach, Promoting Awareness (DOPAteam): A novel science-based approach to teen drug education

Author: *N. T. LICHTENBERG[1], A. B. THOMPSON[1], R. ROMERO-CALDERÓN[2], M. Y. IGUCHI[3], C. EVANS[4]
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Abstract: Drug use beginning in adolescence greatly increases the risk of developing a substance use disorder in adulthood (Chambers et al., 2003; Jordan & Andersen, 2017), making this time period critical for intervention by drug education programs. Drug Abuse Resistance Education (D.A.R.E.) has been widely adopted as an in-school anti-drug educational program for students, despite data showing it to be ineffective and counterproductive in reducing teen drug use (Kumar et al., 2013; Hanson, 2015). Recently, however, novel drug abuse prevention programs such as the keepin' it REAL" curriculum and RAND's Project ALERT have seen success. Using these programs as models, we created our own science-based drug use prevention program focused on teaching high school students (grades 9-12) in the Los Angeles community about the neurobiology behind drugs of abuse. The aim of our program was threefold: to educate teens on the health risks of commonly abused legal and illegal drugs, to convey that drugs have major effects when you stop them which are generally opposite of the intoxicated state, and to increase awareness of addiction as a brain disease that is comorbid with other mental health disorders. This was achieved by conveying unbiased scientific information to students, with an emphasis on novel findings and trends in drug addiction research and public policy. Adolescents are more likely to relate to their peers; so, we trained UCLA undergraduate neuroscience majors who had previously taken a course on drugs of abuse to present accurate and age-appropriate material on drugs to high school students. Specifically, undergraduates designed 15-minute educational presentations, informative pamphlets, and hands-on activities to teach about drugs of abuse and addiction. This curriculum enabled them to master skills in effective and concise science communication, which were ultimately used to reach out to the community when we visited local high school classrooms in the final three weeks of the course. We assessed the immediate effectiveness of the program by administering online surveys to participating high school students prior to and after each visit. Based on survey results, students' perceptions of harmfulness and addictiveness of several drugs of abuse increased after the visit, but primarily for drugs they were unfamiliar with prior to our visit (e.g. prescription opioids and stimulants, GHB, spice). These findings indicate that our science-based education approach changed attitudes about drug risks and addiction. Thus, although currently nascent, DOPAteam has the potential to become widely adopted in the community to impart highly effective drug abuse awareness

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

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.08SU/MMM21

Topic: J.03. Public Awareness of Neuroscience

Support: Army Outreach Educational Program

Title: The Army Educational Outreach Program: Developing a working model of human genetics to predict performance during military combat

Author: S. WADHWA, M. CHEN, A. NIKOLICH, R. RATCLIFFE, V. CAPALDI, *A. J. BRAGER
Behavioral Biol., Walter Reed Army Insitute of Res., Silver Spring, MD

Abstract: The Army Outreach Educational Program (AEOP) allows high school and undergraduate students to conduct real-world research with scientists and engineers in world-class facilities of the Department of Defense. AEOP inspires students to pursue further education and careers in STEM. In one particular Army lab last summer, three students developed a working model to identify inter-individual variation in performance after consuming caffeine and being sleep deprived. The students identified polymorphisms of genes linked to sleep intensity (adenosine system), morning preference (clock genes), and caffeine sensitivity (metabolism) that could address the issue that the United States military prides itself on achieving dominance on the battlefield by means of 'owning the night.' In their model, A1 individuals would be an ideal candidate to perform in military operations. These individuals could have a genetic predisposition that not only allow them to remain unaffected by sleep deprivation, but also allow them to be highly sensitive to caffeine. These individuals would be characterized as peak performers and 'super soldiers.' On the other hand, *B2 individuals would be least suited to perform* military operations due to their inability to perform well after being sleep deprived and low sensitivity (high tolerance) to caffeine. Both traits of poor responses to sleep disruption and caffeine endanger the health and safety of these individuals during military operations. A2 and B1 individuals would be moderately suited for military operations. A2 individuals are able to perform normally under sleep disruption, but caffeine would not be able to give these soldiers a competitive edge like those who fall under A1. B1 individuals would hypothetically be in danger with sleep deprivation during military operations, but their high sensitivity to caffeine could hypothetically keep them out of harm's way. With this knowledge, how soldiers will perform during deployment can be predicted, and countermeasures can be taken before the mission even occurs. These types of STEM outreach opportunities available through AEOP not only benefit the safety of our country but allow students to see how unique the research focus is from traditional academic laboratories.

Disclosures: S. Wadhwa: None. **M. Chen:** None. **A. Nikolich:** None. **R. Ratcliffe:** None. **V. Capaldi:** None. **A.J. Brager:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.09SU/MMM22

Topic: J.03. Public Awareness of Neuroscience

Support: Croatian Society for Neuroscience
European Union through the European Regional Development Fund, Operational Programme Competitiveness and Cohesion, grant agreement No. KK.01.1.1.01.0007, CoRE - Neuro

Title: Croatian society for neuroscience - 17 years of conversation with general public about most exciting topics and advances of brain research

Author: *S. KALANJ-BOGNAR, M. JUDAS, M. VUKSIC, I. KOSTOVIC
Croatian Inst. For Brain Research, Sch. of M, Zagreb, Croatia

Abstract: Being a scientist in Croatia is not one of popular career choices, and the importance of science for society is mostly marginalized. However, people are generally attracted to issues associated with brain research, and exciting questions related to human individuality, cognition, mind and behavior. Indeed, different aspects of brain research have been acquired by Croatian general public thanks to a bunch of enthusiasts working in the field and involved in various outreach actions. Formal setting for gathering neuroscientists in Croatia was enabled by founding the Croatian Institute for Brain Research (CIBR) at Zagreb University School of Medicine, back in 1990. CIBR has meanwhile become the residence of Croatian Society for Neuroscience (CSFN), and has been recognized as Center of Research Excellence for Basic, Clinical and Translational Neuroscience in 2015. Neuroscience popularization events have been organized by CSFN since 2001, when CSFN joined the global initiative - Brain Awareness Week (BAW) just a year after the society was founded. From the very beginning, and thanks to one of its founders and current president Ivica Kostovic (known in the neuroscience community for his discovery of the subplate zone, a transient layer of the developing human brain), CSFN makes it a goal to promote knowledge of brain research by communicating with the public and disseminating important information. BAW activities in Croatia have greatly expanded and today encompass many larger and smaller cities, and practically all Croatian universities, specialized clinical centers, as well as several associations for patients. CSFN gathers highly motivated scientists, experts, teachers, and students from different fields of science and arts that share a passionate interest for neuroscience. Their work and participation during BAW or other neuroscience promotion activities reflect the true interdisciplinary nature of CSFN goals and its outreach mission. CSFN-BAW activities are open to the general public, but children are considered our most important audience, given their contagious and inspirational curiosity for brain facts. If

some children from this group become members of the global neuroscience community because of BAW, then our outreach mission will be fully accomplished.

Disclosures: S. Kalanj-Bognar: None. **M. Judas:** None. **M. Vuksic:** None. **I. Kostovic:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.10SU/MMM23

Topic: J.03. Public Awareness of Neuroscience

Support: Global Advocacy Seed Grant 2016, IBRO-APRC

Title: The 1st neuroscience public event in mongolia

Author: *B. LKHAGVASUREN[1,2], E. LKHAGVASUREN[2], B. TSOLMON[2], J. JAMIYANSUREN[2], S. BAASANJAV[2], D. BOLDBAATAR[2], T. JADAMBA[3], A. BAZAR[4]
[1]Mongolian Fndn. For Sci. and Technol., Ulaanbaatar, Mongolia; [2]Mongolian Natl. Univ. of Med. Sci., Ulaanbaatar, Mongolia; [3]Ministry of Education, Culture, Science, and Sports, Ulaanbaatar, Mongolia; [4]Ctr. for Hlth. Develop., Ulaanbaatar, Mongolia

Abstract: Neuroscience Public Event, the first public event on neuroscience in Mongolia, supported by International Brain Research Organization (IBRO), is successfully held on April 13th and 14th, 2016 at the Mongolian National University of Medical Sciences (MNUMS) in Ulaanbaatar. The main goal of this event was to increase awareness about the importance of neuroscience among the public. The public event included the following activities: plenary lectures for the general population by social leaders, interactive education stations, on-site psychological consultation stations, and fun games. This event was free for everyone who is interested in a science on brain and mind. Therefore, more than 300 people, mostly students, attended the event on both days. This special event has greatly contributed to the development of brain science in Mongolia by giving an opportunity for the public to attend lectures about neuroscience in a plain language and to see how brains process information and react to different stimuli in education stations, and to talk with specialists about their concerns. Mongolian Society of Psychiatry and Mongolian Society for Epilepsy have participated as co-organizers, and MNUMS was the local partner of the event.

Disclosures: B. Lkhagvasuren: None. **E. Lkhagvasuren:** None. **B. Tsolmon:** None. **J. Jamiyansuren:** None. **S. Baasanjav:** None. **D. Boldbaatar:** None. **T. Jadamba:** None. **A. Bazar:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.11SU/MMM24

Topic: J.03. Public Awareness of Neuroscience

Support: Universiti Sains Malaysia (USM) BJIM
Ministry of Higher Education (MOHE) KTP

Title: Malaysia's neuroscience educational community-engagement initiatives

Author: *M. MUZAIMI, F. AHMAD, R. KANDASAMY, Y. TAN, M. MUSTAFA, B. IDRIS, J. ABDULLAH, Z. IDRIS
Universiti Sains Malaysia, Kubang Kerian, Malaysia

Abstract: Malaysia is recognised for its commitment in enriching education and transforming its education system to remain competitive and relevant with the adoption of the Malaysia Education Blueprint (2013-2025). Our institution, Universiti Sains Malaysia (USM) is an established research-intensive University, where our neuroscience team is recognised for the contributions to the neuroscience advocacy efforts alongside several neuroscience professional societies and organisations in the country. In addition, our University-Community engagement (UCE) project, spearheaded by USM Division of Industry & Community Network (BJIM) had been supporting a UCE award-winning project known as BrainBee@USM since 2010. We also co-partnered with 12 other higher education institutions nationwide for this UCE neuroscience project since 2012. The BrainBee@USM project involved both staff and graduate students to engage with pupils and teachers at both primary and secondary school levels in Malaysia. The key focus of the project is to raise awareness and promote wider understanding of the brain and nervous system in the form of knowledge transfer venture. Building from the establishment of USM Neuroscience Club in over 30 schools to date, and having attracted over 6000 students from more than 500 schools nationwide for our national BrainBee@USM neuroscience competition as a part of the International Brain Bee Consortium (University of Maryland, USA), we have established strong partnerships with the Ministry of Education in Malaysia, and continued to strive the mission for educational neuroscience advocacy for Malaysia, and beyond.

Disclosures: M. Muzaimi: None. **F. Ahmad:** None. **R. Kandasamy:** None. **Y. Tan:** None. **M. Mustafa:** None. **B. Idris:** None. **J. Abdullah:** None. **Z. Idris:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.12SU/MMM25

Topic: J.03. Public Awareness of Neuroscience

Title: Baltimore brain connect community outreach

Author: *N. K. HUSSAIN[1,2], M. MAY[3], K. J. MONK[1], S. MAGSAMEN[4], R. L. HUGANIR[1,2]
[1]Dept. of Neurosci., [2]Kavli Neurosci. Discovery Inst., [3]Dept. of Mol. Biol. & Genet., [4]Intl. Arts and Mind Lab., Johns Hopkins Univ. Sch. of Med., Baltimore, MD

Abstract: Over the course of Brain Awareness Week (March 12-18th, 2018), the Baltimore Brain Connect (BBC) coalesced volunteer scientists, artists and educators to introduce art-based neuroscience lessons into the classroom. Fourth graders across Baltimore City learned about neuronal structure, function, and how an individual's emotional and physical state effect brain function and behavior. These lessons were translated into an art activity where students constructed pliable wire and beads into neuronal sculptures and learned how lifestyles and emotions can impact their own brain function. The students chose different colored beads for terminal boutons, where each color represented a distinct physical or emotional state. A second neuro-art project was designed to illustrate the concerns, hopes and ideas are of all ages of people across Baltimore city and to find cohesion and connectedness in those ideas. The art project prompted participants to draw "What's on your Mind" on a stylized upper body image, after reading a brief description of how your brain functions, and how your external environment in turn effects brain function.

To close the week of outreach, the BBC organized a public one-day festival celebrating curiosity and brain research at the Port Discovery Children's Museum in Baltimore. The event showcased hundreds of the "What's on your mind" posters, and an installation of the classroom sculpted neurons. Akin to individual neurons connecting together to form a brain, we assembled each of the neuron art-pieces into one collective sculpture that reflected as a whole the connectedness of Baltimore city. By looking at the colored beads at the ends of neurons we were able to see a snapshot of the emotional state of Baltimore 4th graders. This was a multifaceted event providing educational resources, interactive demonstration booths, a scavenger hunt for scientists, and science projects run by members of the Johns Hopkins research community, as well as other Baltimore based organizations affiliated with neuroscience and science communication.

The goal of the BBC week of events was to make neuroscience and brain research discoveries accessible and engaging to the public, and to spark scientific curiosity in the community. We anticipate developing this into inaugural event that continues to highlight neuroscience in Baltimore and communicate how basic research has a positive impact on our greater society.

Disclosures: N.K. Hussain: None. **M. May:** None. **K.J. Monk:** None. **S. Magsamen:** None. **R.L. Huganir:** None.

Theme J Poster

027. Public Awareness of Neuroscience: Outreach Activities II

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 027.13SU/MMM26

Topic: J.03. Public Awareness of Neuroscience

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

Title: Brainbow Road: Increasing neuroscience knowledge through educational outreach by FSU Neuroscience

Author: *R. VAIDYANATHAN[1], A. STIMMELL[1], C. MARTINEZ[2], E. CHUN[1], R. HEDINGER[3], J. CHITAMAN[3], C. SIMMONS[1], S. TERRILL[1], C. EDWARDS[1], A. BRUNICK[1], J. RYAN[4], M. DONOVAN[1]
[1]Psychology, [2]Florida State Univ., Tallahassee, FL; [3]Florida State Univ., tallahassee, FL; [4]Biomed. Sci., Florida State Univ., Tallahasssee, FL

Abstract: The Florida State University Neuroscience Program Outreach has become a staple within Leon County, increasing neuroscience awareness every year. During the 2017-18 academic year, graduate students visited high school classrooms and elementary 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 12th annual North Florida Brain Bee and 7th annual Brain Fair, and will participate in community educational events. In the fall, we participated in the the Tallahassee Science Festival attracts hundreds of community members of all ages and our program displays hands-on activity booths that aim to increase neuroscience knowledge and interest. We visited 4 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 2018, the Brain Bee attracted competitors not only from Leon County, but also from different cities in Florida and South Georgia. 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 Baltimore, MD. 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 for elementary school aged children. Graduate and undergraduate students across FSU departments had over 20 displays, interactive activities, and demonstrations of basic neuroscience. A free bike helmet giveaway also occurred at the event due to generous contributors; over 50 helmets were fitted and given away to children. This year's Brain Fair theme was "Brainbow Road", a derivation off the Mario Kart video game; Rainbow road. 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 across fields conduct interactive demonstrations for children K-8 as well as their families. Additionally, graduate students and undergraduate representatives visited 2 elementary schools

and educated K-2 through 5 students about the brain with interactive activities. Supported by the 2017 SfN Chapter Grant, FSU Program in Neuroscience, Congress of Graduate Students, Student Government Association, and generous contributions from faculty and private donors.

Disclosures: A. Stimmell: None. **C. Martinez:** None. **E. Chun:** None. **R. Hedinger:** None. **J. Chitaman:** None. **C. Simmons:** None. **S. Terrill:** None. **C. Edwards:** None. **A. Brunick:** None. **J. Ryan:** None. **M. Donovan:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.01SU/MMM27

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

Title: Research integrity oversight and research misconduct investigations at the national science foundation office of the inspector general

Author: *E. RUNKO
Office of Inspector Gen., Natl. Sci. Fndn., Alexandria, VA

Abstract: The Office of Inspector General (OIG) is responsible for conducting inquiries and investigations into compliance with National Science Foundation (NSF) rules, regulations and policies in relation to NSF proposals and awards. NSF OIG investigates allegations of research misconduct. NSF's regulation defines research misconduct as fabrication, falsification, or plagiarism (FFP) in proposing or performing research funded by NSF, reviewing research proposals submitted to NSF, or in reporting research results funded by NSF. OIG does not make findings or take actions, but rather investigates and makes recommendations to NSF which adjudicates and imposes a variety of appropriate actions that range from a letter of reprimand to debarment of an individual from receiving Federal funds. NSF entrusts awardee institutions to provide careful oversight of its awards and to ensure the protection and safety of human subjects and animal subjects utilized in NSF funded research projects. NSF OIG also reviews allegations into noncompliance with the Common Rule and the Institutional Review Board (IRB) protocols and noncompliance with Animal Welfare Act and the Institutional Animal Care and Use Committee (IACUC) protocols. Investigations into these violations could result in an increased oversight and other administrative measures. This poster will present the process for NSF OIG in handling allegations, the investigational proceedings, summaries of imposed actions, and statistics of findings. We will also highlight notable trends in FFP cases and standards in institutions' research integrity investigation reports.

Disclosures: E. Runko: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.02SU/MMM28

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

Title: The ethical implications of media coverage on visual prostheses in the words of visually impaired individuals

Author: *J. PATEL[1], E. HILDT[2], K. L. LAAS[2]
[1]Illinois Inst. of Technol., West Chicago, IL; [2]Ctr. for the Study of Ethics in the Professions, Illinois Inst. of Technol., Chicago, IL

Abstract: This proposal for a poster session focuses on a preliminary research project examining media coverage of developing visual prostheses and investigates visually impaired individuals' attitudes towards how these technologies are portrayed in the popular media. Essentially, we are looking at limitations that might exist in media coverage of this topic, and are extremely interested in getting feedback from members of the visually impaired community about their thoughts on this issue. The aim is to promote discussion amongst journalists, researchers, and the visually impaired population on media frames and ethical issues. More specifically, our aim is to discover which aspects of these visual prostheses appeal to visually impaired populations as well as what concerns they have about the prostheses in order to help advise that future media coverage on this topic address both sides of the spectrum.
For this research, we developed a semi-structured interview guide in order to gauge the opinion of members of the visually impaired community on visual prostheses. Participants were asked to listen to a media clip regarding a developing technology which attempts to partially restore sight: the Argus II Retinal Prosthesis. The participants then shared their insights on the language, framing, benefits, and limitations regarding the media clip. Four 10-15 minute interviews were conducted with individuals working at a Chicago-based social services organization serving visually impaired individuals.
Interviews brought about discussion of the language used in media while describing how these visual prostheses “fix” or “cure” the loss of sight as well as the use of language in regards to the risks and limitations of these emerging technologies. As such, these interviewees represented an “expert” opinion on the topic and had extensive backgrounds in journalism, the needs of the visually impaired community, and an advanced knowledge of current developments in the field of assistive technologies. A common theme amongst the conducted interviews were the insights regarding specific outcomes desired from future technologies as well as hesitations to adopt current technologies due to potential risks and the likely inability for these protheses to restore full vision. Insights from these interviews allowed the project team to better understand the implications that the media can have on visually impaired individuals as well as guided our

approach to the next phase of this project that shall include interviews with a wider population of visually impaired individuals and other activities to promote further discussion among stakeholders around this topic.

Disclosures: J. Patel: None. **E. Hildt:** None. **K.L. Laas:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.03SU/MMM29

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

Title: Referencing autonomy in neural integration: Building on bayesian inferencing for metaethical praxis

Author: *D. C. LARRIVEE
Toronto, CANADA, Intl. Assn. Catholic Bioethicists, Chicago, IL

Abstract: As a traditional locus of value the subjective self has been privileged by social and legal status. Understood to possess an organismal unity, the self is characterized by corporal regulation and delimitation, an operative dynamic that emerges from within, that is, autonomously, and an interiority, distinguished by self agency and self identification [1]. Global models of neural operation suggest that the self arises through network activity encapsulating protagonist features that are directed to neural and bodily integration, that is, an operational and organizational source that secures the unity of the individual ontologically and interactively [2]. Increasingly, empirical studies reveal the emergence of these features from systemic activity wherein the neural architecture, reciprocally and mutually, generates autonomous, holistic behavior. Protagonist features, in consequence, mediate integration by shaping self initiated interactivity with environmental exigencies. For example, evolutionary forces act on the individual as a whole in his responses to environmental variation [3]. Hence, physical mechanisms mediating integration must be contextualized to the whole to generate meaningful behavior. Various studies, moreover, indicate that organismal behavior is constrained by the need to maximize energy efficiency, a requirement that is specifically considered in the context of cognitive operation, and designated The Free Energy Principle [4]. Hence, behavior is postulated to minimize the surprisal of sensory information through Bayesian inferences about the likely consequences of behavior. Accordingly, the identification and characterization of these neural mechanisms are likely to be significant forms of global brain and bodily integration, thereby promoting the unity of the individual. This paper proposes that their determination may be significant neuroethically for identifying the physical sources of self unity and so help to delimit a normative terrain that would be probative for intervention. 1. Morin (2017) 2. Damasio

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Disclosures:

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.04SU/MMM30

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

Title: Pediatric neuropsychiatry and electroconvulsive therapy: Ethical, clinical and legal considerations

Author: *C. COURCHESNE[1], J. ILLES[2], F. VILA-RODRIGUEZ[3]
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Abstract: Electroconvulsive therapy (ECT) is one of the most controversial and polemic treatment approaches in modern psychiatry. Despite mixed acceptance in lay and medical communities, ECT is routinely reported as a highly efficacious intervention for the management of a variety of treatment-refractory neuropsychiatric disorders. While most often reserved for adult patients, ECT is steadily gaining credence as a last resort treatment option for children and adolescents with complex and debilitating conditions such as severe affective and psychotic disorders. ECT causes relatively few, benign adverse effects, decreases hospital stay durations, and achieves high remission rates. One of the most contentious features of ECT, however, is its non-conformity to normative clinical mechanistic reasoning, i.e., there is no clear understanding today of the micro- and macro-level effects of ECT on the brain in relation to psychopathology. Neurophysiological, neurobiochemical, and neuroplasticity theories have all been proposed at the intersection of functional, compositional and structural changes induced by ictal activity. The mechanistic uncertainty of ECT thus poses significant ethical concerns with respect to neurodevelopment and therapeutic potential. Beyond clinical ethics implications, ECT is the only psychiatric intervention regulated by law in the USA: access to this treatment, especially for adolescents, can be legally and ethically complex. Here, we investigate these gaps in ECT research and clinical practice for adolescents through a systematic review of literature. We pair the results of this review with an analysis of 8 case studies of adolescent patients (aged 9-19) treated with ECT. Based on our findings, we recommend the instatement of rigorous, longitudinal, and multi-institutional clinical ECT data collection practices, continued systems-level neuroscience research into the effects of ECT on the developing brain, and a cost-benefit analysis of shifting ECT treatment forward in the neuropsychiatric care pipeline.

Disclosures: J. Illes: None. **F. Vila-Rodriguez:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.05SU/MMM31

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

Title: Teaching detained juveniles about their brains: A study on a novel brain-health intervention at the St. Joseph county juvenile justice center

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Abstract: The goal of the present research was to find if a novel Brain-Health Intervention (BHI) implemented in a juvenile detention facility could change behavior and/or a set of beliefs surrounding autonomy and knowledge over one's brain and behavior. Twenty-six detained juveniles participated in the BHI, which consisted of four, 30-minute lessons over the course of two weeks at the St. Joseph Juvenile Justice Center. Success of the BHI was measured using a behavioral measure and a scale measure. The behavioral incident measure (BIM) compared the number of behavioral incidents that occurred at the detention facility for a given juvenile during the week prior and the week following the BHI. The Brain Health Intervention Scale (BHIS), a 31-statement affirm/deny scale, was implemented immediately prior to the start of the BHI and again immediately after the BHI. The BHIS was divided into four sections based on the four lessons in the BHI: anatomy and function of the brain, emotional regulation, neural plasticity, and development. A score differential was measured by subtracting the initial BHIS score from the final BHIS score. Results indicated the BHI was successful based on the scale measure, but not the behavioral measure. Furthermore, juveniles who had been detained once or twice had a significantly greater score differential overall and a greater score differential for statements on the BHIS surrounding emotional regulation, compared to juveniles who had been detained three or more times. Results provide evidence that this BHI, or programming like it, may be effect as a diversion program for juvenile offenders. Diversion programs for juvenile offenders that include a brain-health component, namely surrounding emotional regulation, must be explored.

Disclosures: M. Hollender: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.06SU/MMM32

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

Support: Initiative for Accelerating Regulatory Science in Innovative Drug, Medical Device, and Regenerative Medicine (Funds from Ministry of Health, Labour and Welfare in Japan)
Research Project for Practical Applications of Regenerative Medicine (Funds from Japan Agency for Medical Research and Development)

Title: Possible loss of personal identity after allogeneic/xenogeneic cell transplantation for cerebral disorder

Author: *H. SHICHINOHE
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Abstract: A recent breakthrough in cell therapy is expected to cure the neurological symptoms associated with various brain disorders. However, the issue concerning patients' personal identity, especially those who undergo allogeneic/xenogeneic cell transplantation, has not yet been considered. The aim of the present study is to analyze the status quo about allogeneic/xenogeneic cell transplantation. Moreover, the personal identity of patients who undergo cell transplantation is discussed from an ethical point of view based on "Relation R" from "Reasons and Persons" written by Derek Parfit. Since the late 1980s, there have been lots of patients with chimeric brain because of allogeneic/xenogeneic cell transplantation to the brain. In Japan, although studies on autologous cell transplantation have preceded, clinical trials for allogeneic cell transplantation have increased in number. If a patient with severe disturbance of consciousness or dementia is treated with allogeneic/xenogeneic cell transplantation, but not autologous cell transplantation, the reason behind the improved consciousness or cognitive function would be the patient's chimeric brain and any "Relation R" would not exist before and after the treatment. If vague sense of incongruity occurs in the patient, it would come from the absence of "Relation R." In conclusion, although the chimeric state is as common as medical treatment including organ and bone marrow transplantation, brain is in a unique position in terms of ethics as an organ with a chimeric state.

Disclosures: H. Shichinohe: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.07SU/MMM33

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

Support: Fred B. Snite Foundation

Title: Time to dump the “dimorphism:" Male and female brains are far more similar than different across multiple measures of structure and function

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Abstract: Research on biological sex differences has enormous currency in the public understanding of human gender disparities, as witnessed by last year’s “Google Memo” controversy. Biologists coined the term “sexual dimorphism” (two shapes) to describe gross morphological differences between male and female individuals, such as the peacock’s tail or human genitalia. But in neuroscience, the term has been over-extended to any statistically-significant brain or behavioral difference between males and females, no matter how small. Such usage reinforces the belief in fixed and binary differences between the brains of males and females, when the real differences are often minimally significant, with extensive overlap between groups. We conducted a comprehensive review of sex difference in human brain structure and function, focusing on large studies (N>200) and meta-analyses. Males’ brains are some 11% larger than females’ from birth through senescence, and complete their growth later during adolescence, mirroring overall body size and growth. Another reproducible difference is gray/white matter ratio, which is some 4% higher in adult females than males but is itself a function of brain size. (Smaller brains have a higher gray/white ratio, regardless of sex.) When it comes to specific structures and activation patterns, however, few sex effects have proven reliable. Thus, the volumes of subcortical brain structures (e.g., hippocampus, amygdala, cerebellum) and specific cortical gyri do not differ between males and females when normalized to brain size, even among large and recent MRI studies. Cortical thickness is also often claimed to differ between sexes, but this is not supported by the collective of two dozen MRI and histological studies. Though long touted as a signature sex difference, inter-hemispheric pathways (corpus callosum & anterior commissure) do not differ in area or volume between sexes, consistent with vanishingly small differences (<1% of population variance) in functional laterality assessed in large behavioral studies. Among fMRI studies of verbal, spatial, and emotion processing, sex findings are highly disparate, with scant consistency in brain foci identified (see also David et al., 2018). Although machine learning can now identify mega-variate resting fMRI metrics to distinguish male from female brains (Zhang et al., 2018), such measures do not map to discrete circuits or structures. We conclude that the term “dimorphism” is not appropriate; portraying brain sex difference as binary or categorical is both false and harmful, given the long history of using biological sex difference to rationalize gender discrimination.

Disclosures: L.S. Eliot: None. **A. Ahmed:** None. **H. Khan:** None. **J. Patel:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.08SU/MMM34

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

Title: A three-pronged approach to science policy: Advocating to scientists, community members and policy-makers

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Abstract: Funding for medical research is considered by many to be one of the last truly bipartisan issues in the government, with a huge majority of Americans supporting funding for the National Institutes of Health. However, reductions in funding for the NIH over the past 15 years—when corrected for inflation—combined with an increased number of applications for research project grants has resulted in a decreasing success rate for applications submitted. This results in fewer grants, fewer new discoveries, and more talented scientists leaving research because low appropriations to the NIH most strongly impact early career scientists who rely on funding from the NIH. The past two years has seen a renewed investment in scientific research by Congress. In an effort to encourage government officials to continue making progress, Early Career Policy Ambassadors and other members of the Society for Neuroscience (SfN) met with members of congress during SfN's Capitol Hill Day. There, we asked for appropriations of at least $39.3 billion to the NIH for the 2019 fiscal year. Participating in Capitol Hill Day clarified how important it is for scientists to become more involved in science advocacy, especially early career scientists whose future is greatly dependent on the continual support of the NIH by Congress. In order to understand what prevents scientists from getting involved in policy, we administered a survey to scientists in diverse regions including Utah, Michigan and Texas measuring attitudes toward science advocacy. It is important for elected representatives to hear directly from scientists and to see for themselves how funding for the NIH is used. Inviting local and state elected representatives to visit research laboratories is one way we can help politicians recognize the importance of biomedical research. In addition, remaining in contact with our legislators is key in encouraging long-term support for the NIH. We also must recognize the importance of communicating the necessity of science funding to the general public as well and gain insights from those not in the research community by advocating in the community. By increasing the involvement of early career scientists in science advocacy, we can be sure that legislators will gain greater insight into the importance of scientific research.

Disclosures: J. Gerson: None. **S.S. Pistorius:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.09SU/MMM35

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

Support: Only personal founding (truly independent research)

Title: Mathematical (dis)continuity conditions: Toward the future of a nature-friendly interhemispheric coupling of brains, minds and computers?

Author: *J. F. GOMEZ-MOLINA
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Abstract: -INTRODUCTION. In order to answer the question "Can we know how much X is conscious, for X= {Patient, embryo, animal, living creature, machine, natural entity}?" we need to appropriately communicate with X, naturally and/or through "connection channels". This issue involves philosophical problems. Clinicians, neuro-engineers, philosophers, independent researchers and citizens should participate in the debate. But, how much should we be in contact with X to have a clear, reproducible and consistent answer? Challenging the conventional view and based on an independent, nature-friendly approach, I propose again, here, that we cannot have a satisfactory response to these questions if we are not: (i) deeply but gently connected with X. (ii) Able to predict the states of X. The last issue is difficult, since apparent (dis)continuity in conscious states and signals is partially (de)constructed by (derivative)integrative and anticipative processes of the memory and the ego. -METHODS. Analysis of previous research (Gomez 1984-2018). First-person sleep and clinical phenomenology. -RESULTS. (i) For X = (animals with brains), an ideal form of friendly communication is by using a fast interhemispheric (non-invasive, real time,) form like electromagnetic communication (e.g. EEG, TMS, NIRS, MR-techniques), within a shared sensory workspace. (ii) (Dis)continuity conditions in activity and signals as well as in time and space between neural systems are important to decide when we can act on X or if X can be responsive to a treatment. -DISCUSSION. (1) ¿When we know enough about the brain to be legitimately authorized to transform it? (Gomez 2018, Conference-Debate at Otraparte Museum). ¿Is reducing suffering of X more important than respecting the cognitive continuity of X, her/his integrity, autonomy or free expression? (2) Simple introspection techniques can show that there is not a clear, first-hand experience or reference of unconsciousness states. Contrary to popular belief, EEG and introspective evidence suggest that we might have some consciousness during deep sleep; even some dreams and "awake cell groups" can form connected networks through the CC (Gomez and Lopera, 1997). -CONCLUSIONS. A cautionary attitude is necessary in relation to any strong claim about our brains from both reductionists and strong dualists. We probably know less about our nature than what we want to believe. An electromagnetic, strongly probabilistic and resonant organ as our brain will probably give us surprises about new forms of (dis)continuity in space and time--now called differentiation and integration by Giulio Tononi- but we are still far from having clear model or evidence of it.

Disclosures: J.F. Gomez-Molina: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.10SU/MMM36

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

Support: The Johns Hopkins Graduate Student Association
The Johns Hopkins Alumni Association
The Johns Hopkins Public Health Student Assembly

Title: Johns hopkins science policy group: Engaging early career researchers in advocacy

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Abstract: The National Institutes of Health (NIH) is the largest source of public investment in biomedical research in the world, with a 2018 federal budget of $37 billion. Meanwhile, the 2018 National Science Foundation (NSF) budget of $7.8 billion supports nearly a quarter of all basic research in US colleges and universities. Despite the rising cost of research and the increased number of meritorious grant submissions, funding for NIH/NSF has remained flat for over a decade. When accounting for inflation, NIH/NSF is 20% underfunded relative to 2003 levels. Meanwhile, misinformation, pseudo-science, and science skepticism complicate public discourse on issues such as the disease model of addiction, the safety of child immunization, or the role of human activity in global warming. The misalignment between scientific consensus and the views of constituents or elected representatives can stall the development of evidence-based policy solutions. In this climate, many scientists are cognizant of the need to publicly champion the value of research; to lobby Congress for robust, sustainable federal funding of NIH/NSF; and to encourage lawmakers to use evidence in policy decisions. However, early career researchers (ECRs) have limited opportunities to engage in advocacy. In response to this challenge, the Johns Hopkins Science Policy Group (JHSPG) provides ECRs with hands-on training and skills development in advocacy. We also provide resources to help ECRs articulate how scientific evidence can inform policy decisions. JHSPG coordinates advocacy initiatives; an invited speaker series of policy professionals; science communication workshops; and the production of educational resources. Our advocacy events have covered NIH/NSF federal funding, climate change, prescription drug pricing regulation, taxation of graduate stipends, firearm violence prevention research - and more. JHSPG represents a successful model for engaging ECRs in 1) grassroots advocacy 2) science communication to non-academic audiences 3) and discussions

about the role of scientific evidence in public affairs. JHSPG is currently led by co-founders C. Matney and R. Sima and Executive Board Members L. Cairns, K. Wood, and M. Spaur. C. Matney is also a 2018 Society for Neuroscience Early Career Policy Ambassador.

Disclosures: C. Matney: None. **R. Sima:** None. **L. Cairns:** None. **K. Wood:** None. **M. Spaur:** None. **S.P. Brown:** None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.11SU/MMM37

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

Support: SfN's Early Career Policy Ambassador Program

Title: Engaging local policy makers: strategies for scientists

Author: *J. LUCHSINGER
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Abstract: Sustained and robust funding for research is critical to the ongoing success of scientific progress in the United States. Despite gains in the past few months, stable increases are needed if we are to continue to reap the rewards of the scientific infrastructure and human capital constructed over the past many decades. To ensure our elected leaders appreciate the importance of sustained and robust funding, the scientific community has the responsibility to engage with their respective representatives and communicate the seriousness of this need. The Early Career Policy Ambassador (ECPA) Program empowers developing scientist to engage with lawmakers and to enable those around them to do likewise. Lessons learned from the ECPA program, SfN’s Hill Day, Rally for Medical Research, in district meetings, and, advocacy training events will be shared. Because advocacy and policy are often skills outside of the normal science curriculum, this poster describes activities that other interested scientists could implement at their institutions and some best practices when engaging policy makers.

Disclosures: J. Luchsinger: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.12SU/MMM38

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

Title: Being conscious of brain death: Technical and ethical issues

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Abstract: In the 50 years since the Harvard brain death criteria were established, immense progress has been made in neuroscientific research of consciousness. This research has advanced our understanding of consciousness regarding its empirical properties, relation to other brain functions, disorder manifestations, neuroimaging findings, and therapeutic strategies. However, these investigations highlight technical issues with the definition and determination of brain death that have failed to keep pace with advancing understanding of consciousness.
Brain death is defined as the irreversible loss of all functions of the brain. Thus, consciousness may complicate brain death determination diagnostically and interventionally. Despite advances, consciousness remains diagnostically problematic for brain death in the following ways: currently no consensus on the definition or determination of consciousness exists within the medical community; its direct assessment is not required in brain death determination; clinical exams of disorders of consciousness are often mistaken, with cases of "brain-dead" patients retaining consciousness being reported; neural (brainstem) pathways of clinical assessment may be defunct, whereas cerebral consciousness is not; neuroimaging studies remain preliminary; and (exclusory) cerebral bloodflow scans are not compulsory. As such, current criteria for assessment fail to rule out the possibility that a 'brain dead' patient may retain some level of consciousness. Additionally, recent advances in interventional techniques to alter levels of consciousness may challenge the 'irreversibility' requirement of brain death.
These issues elucidate significant ethical implications for the determination of brain death: life-sustaining treatment may be erroneously withdrawn from 'dead' patients; organs may be procured in contravention of the dead donor rule; patients may suffer from remaining or becoming conscious of their dysfunctional states; and the confusing and problematic legal-biologic conceptual gap of brain death may be widened.
Therefore, a way forward is needed. We propose four preliminary recommendations. First, a functional definition of consciousness should be instituted. Second, direct assessment of consciousness via non-brainstem pathways should be codified and required. Third, conceptual and empirical thresholds for the legal-biological gap between brain death definitions should be established in order to re-assess the distinction's operationalizability. Finally, professional guidelines should be established for alteration and augmentation of consciousness clinically and in research.

Disclosures: R. Evans: None.

Theme J Poster

028. Ethical and Policy Issues in Neuroscience

Location: SDCC Halls B-H

Time: Sunday, November 4, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 028.13SU/MMM39

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

Title: Scientist Advocates: Shifting the culture toward justice, equity, and diverse representation through community organizing, data transparency, and education

Author: *K. L. REICHARD[1], M. R. LEVINSTEIN[2], L. VOELKER[4], N. MESA[5], C. RUSCH[3], J. S. STEGER[1]
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Abstract: The Society for Neuroscience FY2016 survey identified that while 58% and 22% of predoctoral fellows were women and minorities, respectively, these groups only hold 32% and 10% of professorships in the field. These data indicate that although programs designed to recruit a more diverse pool of graduate students have been successful, rates of retention of underrepresented minorities (URMs) and women into the professoriate still lag behind. Many programs now focus on providing additional mentorship and funding opportunities to close this gap, but cultural change is necessary to retain a successful, diverse, and well-supported next generation of research faculty. At the University of Washington, we have formed SARJE, Scientists Advocating for Representation, Justice, and Equity, to push for cultural changes to improve the experience of marginalized people in STEM and close the “leaky pipeline”. SARJE advocates for departmental equity committees, changes to hiring and recruitment practices to increase representation and retention of URMs within departments, and trainings focused on reducing implicit bias, preventing sexual harassment, and developing anti-racist curriculum. We will highlight best practices for developing a group focused on equity in STEM and present data on speaker representation in seminar series within the UW School of Medicine. Our poster will feature content from our first “toolkit”, in which we provide evidence-based resources for students wanting to advocate for equity-focused change within their own departments while building and maintaining relationships with faculty and department administrators. It is our hope that the strategies presented in the poster will facilitate the creation of similar groups at other universities focused on protecting and supporting marginalized members of our scientific community.

Disclosures: M.R. Levinstein: None. **L. Voelker:** None. **N. Mesa:** None. **C. Rusch:** None. **J.S. Steger:** None.