# EDITORIAL
# JUNE: The Journal of Neuroscience Education

**Bruce R. Johnson**
*Department of Neurobiology and Behavior, Cornell University, Ithaca, NY 14853.*

Several years ago, Michael Zigmond, Michelle Mynlieff and I searched for other educational journals that focused on neuroscience education, and did not find any (please let me know if we missed one). There are journals that publish undergraduate research, but JUNE uniquely disseminates faculty activities that describe best practices in neuroscience education. This was a vision created by Julio Ramirez and Barbara Lom and supported by FUN. From JUNE's origins, undergraduate education has been the priority, and we also welcome articles on graduate neuroscience education and neuroscience faculty development. As I end my term as chief editor of JUNE, I appreciate that I have ridden the wave of creativity initiated (Dunbar et al., 2009) and sustained by previous JUNE chief editors and the JUNE Editorial and Review Boards. The insightful support of FUN members through the FUN Executive Committee gave JUNE the resources to thrive.

This has been a busy year for JUNE with two regular issues and an issue of presentations at the FUN Workshop. The 8th FUN Workshop, held in July 2017 at Dominican University in River Forest, Illinois and hosted by Irina Calin-Jageman and Robert Calin-Jageman, produced an especially rich issue (Vol 16[3], http://www.funjournal.org/) containing three short educational Perspectives and seventeen full Articles. These papers highlight the creativity and persistent dedication of FUN members to enhance undergraduate neuroscience education. See the Workshop editorial for details (Calin-Jageman et al., 2018).

This new issue begins with a short Perspective piece that we hope will be a regular feature in JUNE. These pieces will briefly present educational developments that may lack detailed student and learning assessment. They may be followed by a longer Article, with assessment, after an author, or other faculty, has tested the development in a class. The goal is to bring new ideas quickly to JUNE readers, especially if a course is not offered frequently for full student assessment. Here, Schaefer describes her "Understanding Checkpoints" strategy for a deeper understanding of course material. After relevant course content is presented in class, students receive previously unseen figures from neuroscience journals that address the content, and questions to answer about methods, results and their implications. They then read the original publication and self-grade their quizzes. Student and instructor feedback suggests this process develops a deeper understanding of the course material. This exercise was originally presented at the 2017 Faculty for Undergraduate Neuroscience Workshop as a teaching demonstration. We encourage other demonstration presenters at the FUN Workshop to submit their ideas to JUNE, too.

Five Articles in this issue describe active learning in the undergraduate laboratory setting. An inquiry based lab with a neuroscience theme for freshman biology students is detailed by Brabec et al. The goal is to enhance student retention and interest in biology though examining the effects of ethanol on movement and learning in the worm *C. elegans*. Students' self-report gains in technical skills and positive attitudes toward research-like experiences after the lab. Ledwidge et al. describe details for setting up a cost-effective EEG lab for student research and teaching. Interest in EEG work for students has been expressed in a number of JUNE articles (for example, Miller et al., 2008; Marshall et al., 2011; Nyhus and Curtis, 2016, Shields et al., 2016), and the Ledwidge et al. article provides practical advice for setting this up. Petersen et al. approach hair cell structure and function in laboratory exercises using fluorescence microscopy to characterize pharmacological block of ion channels in the zebrafish model system. Students learn fluorescent labeling, microscopy, data acquisition and image analysis. The effects of caffeine and pseudoephedrine on anxiety in rats is the theme for a student research experience (Howerter et al.). Students actively participate in all steps of a research project to learn the scientific process and the practicalities of vertebrate research. In the last of this series of primarily lab-based activities, Glover and Lauzon present a simple psychophysical exercise for students to study the Hermann Grid illusion. The students compared their results to predictions from hypotheses of retinal and higher level neural processing, and came to interesting conclusions that fit both levels of neural processing predictions, but neither alone.

Three Articles have a laboratory experience or student community engagement as part of an active learning experience. Fromherz et al. describe two classroom-based programs to support underserved STEM student success in practicing science from the desk to the rig to results presentation. In the first, *Connecting Life*, community college students learn to run microscopy stations for single cell observations, and thus build the skills and confidence to participate in a Summer Research Institute (SRI). In the SRI, these students work on research projects which include optogenetic manipulation of neural activity in chick embryos and monitoring of neural activity with voltage sensitive dyes. Assessment showed that the students gained an understanding and appreciation of the scientific process, and confidence in the skills necessary to do science. In the second article,

undergraduate neuroscience students teach STEM based activities to elementary school students with neuroscience themes that are interesting and conceptually accessible to children (Bazzett et al.). In the third of these Articles, students in a Health Psychology course educate their college peers through "action projects" (Kennedy). The Article describes the different media presentations produced by students for both large and small peer audiences to address the potential harmful effects of abusing prescription stimulants.

Four innovative courses or activities are described. The first is an online course in "Neuroscience and Sustainability" (Wolfe and Lindeborg). Students complete a stand-alone online "Environmental Neuroscience Module" as part of a Brain and Behavior course. They link fundamental neuroscience concepts with environmental effects on neuroanatomy, development and plasticity, sensation and perception, sleep and circadian rhythms, emotion and motivation. The students report greater environmental concern after the online module. Another Article describes a course that combines learning and meditation practices with basic neuroscience studies (Olsen). Traditional neuroscience topics are covered as well as laboratory exercises which include sheep brain dissection, physiological measurements of the autonomic nervous system, EEG, salivary enzyme assays, attention testing and psychological questionnaires. The integration of contemplative practices improved student attitudes towards meditation and increased positive attitudes toward science. The third Article (Pollack) incorporates a team based learning approach where students actually read the assigned text before class (see below). In class, they first answer quiz questions on the material individually and then work in teams to answer the same questions. This promotes collaborative learning and taking responsibility for self-study in an effective manner. In the final learning activity in this series (Cammack) students analyze fictional journal-like datasets to understand principles of synaptic transmission and changes in synaptic strength. Assessment of student perceptions and knowledge suggest that this activity promotes critical thinking and deep learning. It would work well in a team-based learning approach, too.

Two other interesting Articles round out the full Article series. The first is a description of an important resource for neuroscience students, iBiology. This is a free website that produces online resources for science education, and in this Article, Rajan and Veguilla focus on the neuroscience content. One reviewer commented that the site had so many interesting resources that she spent her planned time for reviewing the Article mostly browsing the site. The final full Article in this issue reports on a survey of qualities that neuroscience graduate schools look for in applications (Boyette-Davis). Although limited in its survey scope, it has helpful information for faculty advising and for undergraduate students interested in graduate studies. A number of resources for faculty advising and graduate information have appeared lately. A paper in the FUN Workshop issue also gives useful advice on graduate school qualifications and what comes after (McLoon and Redish, 2018), and the following advice appeared recently in NEURONONLINE: "How to choose a grad school (and decide when to start)" by Amy Jo Stavnezer, "5 factors to consider (besides research) when applying to graduate programs" by Kavya Devarakonda, and "The benefits of taking a gap year before grad school" by Rahul Patel (see links below).

Lastly, we have one Technical Paper in this issue which describes how to train honey bees to a new food source for undergraduate learning and memory projects (Van Nest and Moore). There is a rich literature, often overlooked, on the sophisticated learning and memory capabilities of bees that merits closer attention for our neuroscience teaching (Greenspan, 2007; see also Van Nest, 2018). Two Reviews wind up the issue. Lom offers a candid opinion of the new book, "A Review of Developmental Neurobiology" by Lynne Bianchi. Palissery et al. review six autobiographies and two realistic fiction books that address struggles with mental illness. In addition to description of the books and their educational value, they give sound advice how to present these topics with care for student mental health.

Finally, I end with mentioning resources for getting students to read assigned material. A FUN Workshop presentation addressed this issue. Strategies for motivating students to read and learn something from assigned readings are discussed (Cressman, 2018). See also Starcher and Proifitt (2011) and Weimer (2010) for more perspectives on this important topic.

This description of new and recent JUNE content and related resources emphasizes to me, and hopefully to the reader, that JUNE is THE journal of neuroscience education. I end my three-year term as JUNE Editor in Chief with a gratifying feeling of helping facilitate the dissemination of best teaching practices in neuroscience.

## REFERENCES

Calin-Jageman RJ, Calin-Jageman IE, Martinez Acosta V, Hardwick J, Johnson BR, Wiertelak EP (2018) Best practices for developing, assessing, and sustaining inclusive curricula: Proceedings of the 2017 Faculty for Undergraduate Neuroscience Workshop. J Undergrad Neurosci Educ 16(3):A42-53.

Cressman J (2018) "Doing" the reading: What neuroscience instructors should know about reading compliance and comprehension in college. J Undergrad Neurosci Educ 16(3):A217-219.

Dunbar GL, Lom B, Grisham W, Ramirez, JJ (2009) The journal of undergraduate neuroscience education: History, challenges, and future developments. J Undergrad Neurosci Educ 8(1):A78-81.

Greenspan JR (2007) An introduction to nervous systems. Long Island, NY: Cold Spring Harbor Press.

Marshall JC, Malerba JR, and Schroeder JA (2011) Use of personal EEG monitors in a behavioral neuroscience course to investigate natural setting sleep patterns and the factors affecting them in college students. J Undergrad Neurosci Educ 10:A65-70.

McLoon LK, Redish AD (2018) Demystifying graduate school: Navigating a PhD in neuroscience and beyond. J Undergrad Neurosci Educ 8(3):A203-209.

Miller NR, Troyer M, Busey T (2008) Virtual EEG: A software-Based electroencephalogram designed for undergraduate

neuroscience-related courses. J Undergrad Neurosci Educ 7:A19-25.

Nyhus E, Curtis N (2016) Incorporating an ERP project into undergraduate instruction. J Undergrad Neurosci Educ 14:A91-96.

Shields SM, Morse CE, Applebaugh ED, Muntz TL, Nichols DF (2016) Are electrode caps worth the investment? An evaluation of EEG methods in undergraduate neuroscience laboratory courses and research. J Undergrad Neurosci Educ 7:A29-37.

Starcher K, Proffitt D (2011) Encouraging students to read: What professors are (and aren't) doing about it. Int J Teach Learn High Educ 23(3):396-407.

Van Nest BN (2018) The olfactory proboscis extension response in the honey bee: a laboratory exercise in classical conditioning. J Undergrad Neurosci Educ 16:A168–A176.

Weimer M (ed.) (2010) 11 Strategies for getting students to read what's assigned. The teaching professor, July. Madison, WI: Magna Publications, Inc. Available at: https://www.facultyfocus.com/free-reports/11-strategies-for-getting-students-to-read-whats-assigned/.

## APPENDIX: NEURONONLINE LINKS

(1) How to choose a grad school (and decide when to start)
https://neuronline.sfn.org/Articles/Career-Advice/2018/How-to-Choose-a-Grad-School-and-Decide-When-to-Start

(2) 5 Factors to Consider (besides research) when applying to graduate programs
https://neuronline.sfn.org/Articles/Professional-Development/2015/5-Factors-to-Consider-Besides-Research-When-Applying-to-Graduate-Programs?utm_source=hubspot&utm_medium=email&utm_campaign=Targeted&utm_content=oct&_hsenc=p2ANqtz-8AFxBqQYGtuLdRM7VKVlaUKGIG6LIEf-E8m2MW8m3XkYKD26preyQIoOntYgfi_Q-BpyVw3-DqRRSuWKGODxFnGjZ1oQ&_hsmi=66368027

(3) The benefits of taking a gap year before grad school
https://neuronline.sfn.org/Articles/Career-Advice/2018/The-Benefits-of-Taking-a-Gap-Year-Before-Grad-School?utm_source=hubspot&utm_medium=email&utm_campaign=Targeted&utm_content=oct&_hsenc=p2ANqtz-8AFxBqQYGtuLdRM7VKVlaUKGIG6LIEf-E8m2MW8m3XkYKD26preyQIoOntYgfi_Q-BpyVw3-DqRRSuWKGODxFnGjZ1oQ&_hsmi=66368027

Address correspondence to: Dr. Bruce R. Johnson, Department of Neurobiology and Behavior, S.G. Mudd Hall, 215 Tower Rd, Cornell University, Ithaca, NY 14853. Email: brj1@cornell.edu