

Report: 2020 Annual Meeting and Student Research Conference of Sigma Xi

by Willy Hereman, Vice President of Mines Chapter

Sigma Xi members and chapter delegates, researchers, artists, and students came together virtually November 5–8 for the 2020 Sigma Xi Annual Meeting, Student Research Conference, and Art Exhibit. The theme of this year’s meeting was Hacking the Brain: The Intersection Between Art and Neuroscience, encouraging discussions on what art and science can achieve together that neither could accomplish alone.

The conference was attended by over 800 research professionals, thought-leaders, communicators, and students from across the scientific and engineering disciplines. I had the privilege to represent Mines as a designated delegate. As my first conference in virtual format (Zoom) and outside my research discipline (mathematics), I found it a rewarding experience surpassing my expectations. The summary below covers the highlights of the meeting annotated with some personal comments, and followed by possible initiatives for our local chapter.

The **first day** was reserved for a business meeting for delegates who represented Sigma Xi chapters and the Membership-at-Large constituency. Sigma Xi leaders provided background information about the society, presented the vision and strategy plan for 2020-2025, and discussed finances of the Society.

My take-away from the business meeting is the following: With about 26,000 members (decreasing by about 7% per year from a high of 55,000 in 2008), Sigma Xi is still the world’s largest multidisciplinary honor society for scientists and engineers. Based in Research Triangle Park (NC), Sigma Xi has over 500 chapters around the world at colleges, universities, government laboratories, and industry research centers. Its mission is to enhance the health of the research enterprise, foster integrity in science and engineering, and to promote the public understanding of science and the science process for the purpose of improving the human condition. More than 200 Nobel Prize winners have been members. Current president Sonya Smith (Professor of Mechanical Engineering, Howard University) will be succeeded by President Elect Robert Pennock (Professor of Philosophy, Michigan State University) while Jamie Vernon remains Executive Director and CEO.

The caucuses for the Northwest Region and Research and Doctoral Universities (to which our chapter belong) discussed local initiatives and reviewed a resolution on ‘Diversity, Equity, and Inclusion’ which was later adopted at the Assembly of Delegates. Sigma Xi is proud to report that in the 2020 volume of American Scientist 34% of authors were people of color and 38% were women.

The **second day** started with keynote speaker Barbara Landau (Professor of Cognitive Science, Johns Hopkins University) who presented “Unforgettable: When an Amnesic Artist Remembers”, a case study of an accomplished graphic artist who suffered amnesia due to damage to the hippocampus caused by encephalitis.

In his plenary talk “The Aesthetic Brain: On Beauty, Buildings, and Art,” Anjan Chatterjee (Professor of Neurology, Psychology, and Architecture, University of Pennsylvania) showed how our brains respond to aesthetic experiences. Confirmed by laboratory experiments, he argued that, e.g., facial beauty can subconsciously twist our validation system (good looking people are

perceived to be smarter than ugly ones). Similarly, viewing aesthetically pleasing architectural interiors or engagement with art can create a sense of well-being.

Under the catchy title “Cracking the Walnut” – the walnut referring to Einstein’s brain – Rachael Cusick (Associate Producer of RadioLab, NPR) discussed the 2019 documentary series on intelligence and a search for genius, including how art and science together can unlock mysteries that neither could have found alone. I regularly listen to the RadioLab show and I highly recommend the Podcast series (<https://www.wnycstudios.org/podcasts/radiolab>).

Breakout sessions included panel discussions, specialized talks, and workshops across six conference tracks. I participated in the ‘Research Enterprise and Professional Development’ workshop where Dennis Hess (Emeritus Professor, Georgia Institute of Technology) discussed the “Transition from a Technical Mindset to a Technical Leader Mindset” based on his experiences as department chair and dean. As former Department Head I could have benefitted from his seminar which teaches scientists and engineers leadership skills and problem solving to facilitate management of team members, faculty, and staff. Hess’s presentation was laced with witty quotes such as “Leadership requires diplomacy, that is, being able to tell somebody to go to hell in such way that they are looking forward to the trip” (attributed to Caskie Stinnett, Winston Churchill, and others).

On the **third day** I attended the talk “A Science Comedian’s Guide to Communicating Science” by Brian Malow. He had great advice for speakers: “Be prepared, practice your talk but do not sound scripted. Adjust the amount of material to fit the allotted time. Be yourself, be present in the moment, spontaneous and human. Be passionate and speak from what you know. Know your audience – they should be central to your thinking. Translate the facts in what they mean. Set up your talk as a puzzle to be solved or a mystery to be revealed. Strip your talk to what is necessary for the punch line.”

Bonnie Dunbar (Research Professor of Aerospace Engineering, Texas A&M University) spoke about her past career as NASA astronaut. Her story is truly inspirational: from humble beginnings on a farm in Sunnyside (WA) to first generation college student, then helping to build the Space Shuttle Columbia at Rockwell International Space Division, and finally flying five space shuttle flights, including two dockings with the Mir space station.

Plenary speaker Larry Sherman (Professor of Neuroscience, Oregon Health & Science University and accomplished pianist) discussed why “Every Brain Needs Music,” a multimedia presentation with live music that explores neuroscience research on how the brain creates, performs, and responds to music. Studies have shown that listening to music and practicing and performing music can influence brain development and brain repair in people with brain injuries and neurodegenerative diseases. The take-away: Play some music (self or recorded) or even better, learn to play an instrument.

Other plenary speakers included Sigma Xi’s 2020 Gold Key award winner physicist Walter Massey who reflected on his career as past President of Moorehouse College and former Director of NSF and Argonne National Laboratory, and addressed social justice and diversity in STEM. He argued that social equity, inclusion and diversity are essential to the health and progress of science. Providing different perspectives and diverse points of view due to different backgrounds will provide new insights that will make science flourish. His remarks were followed by a discussion with 2017 Nobel Laureate Kip Thorne (theoretical physicist, Nobel prize

for detection of gravitational waves) moderated by NPR science correspondent Joe Palca.

The **last day** was focused on the Student Research Conference and STEM Art & Film Festival. Approximately 400 high school, undergraduate, and graduate students presented their research and creative works, including video clips, origami, and art installations. The accompanying panel discussion was moderated by science journalist Kiki Sanford (Broader Impacts Productions). Sigma Xi members judged the students on scientific thought, methodology, creativity, and communication skills. Top presenters received a monetary award and nomination to Sigma Xi membership with initiation fees and first year's dues paid.

Science rap artist and wordsmith Baba Brinkman provided the conference entertainment by performing a series of free-style 'rap ups' that summarized events throughout the meeting.

Possible initiatives for our chapter (some with potential subsidies from the Society):

- Continue to support undergraduate and graduate research opportunities at Mines. For instance, provide information about NSF's Research Opportunities for Undergraduate program and encourage award winners of the Mines Graduate Research and Discovery Symposium (GRADS) to present their research at the College and Graduate Student Fair or the Annual Student Research Conference, both organized by Sigma Xi. Our Chapter currently participates in GRADS by providing judges, the awarding of prizes, as well as some financial assistance.
- Continue to nominate Mines faculty & researchers, alumni, and students for membership to Sigma Xi. Contact recent PhD students and alumni, in particular, those who were recognized for achievements and/or featured in the media. Recognizing that graduate students are the future of Sigma Xi its emphasis is shifting from "being nominated" toward "wanting to join" by extending its portfolio of benefits to members.
- Organize a "Science Café" (www.sciencecafes.org) to engage the non-scientific community into science. Apart from organizing laboratory tours on campus, Mines scientists and engineers could informally share their research in a friendly setting (e.g., libraries, museums, bookstores, theaters, coffee shops and bars). 'Skype a scientist', 'science by the glass', 'science pub night', 'science movie night' are among the possibilities and Mines Museum would be a great venue for outreach events.
- Invite a speaker from Sigma Xi Distinguished Lectureships Program (www.sigmaxi.org/program/lectureships) at induction ceremonies for new Sigma Xi members or at "Order of the Engineer" events, the latter in collaboration with Mines Alumni Association. The 2020-21 Distinguished Lectures are focused on COVID-19 and presented virtually.
- Strengthen our chapter's ties with the Osher Lifelong Learning Institute (OLLI) which informs senior citizens about current research through a series of lectures. Get involved with the Citizen Science Alliance (www.citizensciencealliance.org) which uses internet-based citizen science projects to further science itself and promote the public's understanding of science.

- Organize outreach activities for pre-college STEM students. For example, visit High Schools, Girl Scouts and Boy Scouts, and other organizations in the area. Provide judges to High School Science Clubs and help develop resources for science teachers. Reciprocally, bring talented middle and high school students to Mines to talk about the research projects they are doing.
- Establish partnerships with the Society for Women Engineers (SWE) and Women in Science, Engineering and Mathematics (WISEM) at Mines to jointly get involved with Techbridge Girls (techbridgegirls.org) or Science Cheerleaders (sciencecheerleaders.org) to inspire girls to discover a passion for science, technology, engineering and mathematics.

As always, we encourage you to nominate colleagues, advanced students, and alumni for membership in the Society. The membership qualifications can be found on the Sigma Xi website: www.sigmaxi.org. A nomination for membership in Sigma Xi is a terrific way to recognize research achievements by faculty members, fellow scientists and engineers, and advanced students. Any of our chapter officers will be happy to help you with the process.

Next Annual Meeting: The 2021 Sigma Xi Annual Meeting and Student Research Conference, hopefully in person, is scheduled for Nov. 5-7 in Niagara Falls (NY). Everyone is invited to participate.