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Arkansas Catalyst, December 2013

University of Arkansas, Fayetteville

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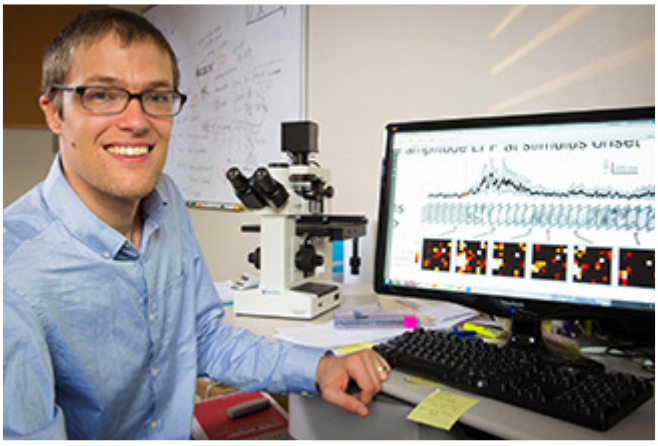
The Arkansas Catalyst

December 2013

Physicist Receives National Science Foundation Funding for Brain Research



Woodrow Shew

As a neurophysicist, Woodrow Shew is intrigued by how the brain processes information, particularly the way the brain's neural circuits process information.

"My research is a hybrid of physics and neuroscience," said Shew, an assistant professor of physics in the J. William Fulbright College of Arts and Sciences.

"I'm interested in how a network of neurons processes information. Neurons are simple and interact according to simple rules. When amazingly complex phenomena such as perception and behavior emerge from such simple interactions — it appeals to a physicist."

Shew conducted postdoctoral research in neuroscience at the National Institutes of Health before coming to the University of Arkansas in January 2012. The experiments in his lab currently focus on the biophysics of the brain including neural network dynamics, neural phase transitions, and cerebral blood flow dynamics.

"The conceptual simplicity of neurons is well-suited to physics theory, but often the predictions made by physics theorists are never tested. This is because biologists don't have the training to understand the predictions and physics theorists don't have the training to do biology experiments. My lab and my training fill that gap – we understand the predictions and carefully design experiments to test them in real brains.

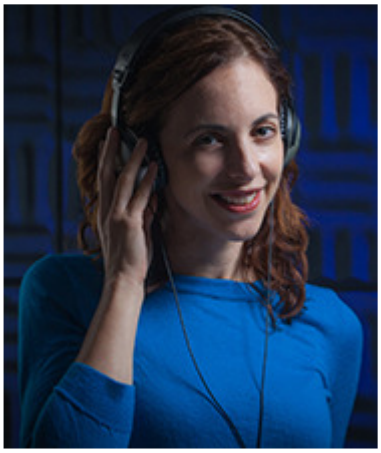
"In the brain, the basic elements are the nerve cells: the neurons," he said. "A neuron is like a binary bit in a computer. It is firing little electrical impulses that travel down wires that connect each neuron to each other. Those little pulse-like signals are like on-off signals, and that kind of simplicity is well-suited to physics theory.

The National Science Foundation has awarded Shew a $361,347, three-year grant for a collaborative research project with biophysicist Ralf Wessel at Washington University in St. Louis. The scientists and their research teams will investigate how turtle brains process visual information.

"It's surprising how much similarity there is from one brain to another, even across species," Shew said. "The turtle has parts of its brain that are analogous to the human brain early in our evolution. If we find similarities in how a turtle brain processes visual information compared to a mammal, we are establishing general principles about how a brain works across species. General principles are what get physicists really excited and have the potential to advance fundamental understanding of neuroscience."

For more information about his research or grant, send an e-mail to shew@uark.edu.

Researcher publishes study of musical repetitiveness



Lisa Hellmuth Margulis

In On Repeat: How Music Plays the Mind, Elizabeth Hellmuth Margulis explores the psychology of repetition in music, across time, style and cultures. Hers is the first in-depth study of repetitiveness in music, which she calls "at once entirely ordinary and entirely mysterious" and "so common as to seem almost invisible."

On Repeat, published by Oxford University Press, offers new insights into the relationship between music and language, the nature of musical pleasure and the cognitive science of repetition in music.

Margulis, an associate professor of music in the J. William Fulbright College of Arts and Sciences, writes that music "is a fundamentally human capacity, present in all known cultures, and important to intellectual, emotional and social experience." And repetition is a key element in music, one that both pulls us into the experience and pulls us together as people.

In her research, Margulis drew on a range of disciplines, including music theory, psycholinguistics, neuroscience and cognitive psychology, to examine how listeners perceive and respond to repetition. She worked with

IN THIS ISSUE

IN OTHER NEWS

HELPFUL LINKS

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ethnomusicologists to understand the place of music and its repetitive features in cultures around the world.

Learn More

Research Commercialization Course Set for Spring

Ken Vickers

Ken Vickers, director of the microelectronics -photonics interdisciplinary graduate program at the U of A, welcomes faculty and students to enroll in his research commercialization class for the spring semester.

The graduate course, titled MEPH 5383, will meet at 3:30-4:45 p.m. on Tuesdays and Thursdays in the Bell Engineering Center. It is approved to fulfill the elective course requirement in the university's graduate certificate in entrepreneurship program in the Sam M. Walton College of Business.

The course is a multidisciplinary review of the management of the development of new technical products and services in entrepreneurial startups, as well as in intrapreneurial activities in existing companies. The course includes examination of the search and evaluation for new technical products; development of business plans, resources, and prototypes; and managing the launch and business development of new products.

The Walton College introduced the graduate certificate in entrepreneurship for non-business majors in 2006. The program has included four engineering students in the past three years who started or are starting companies based on their doctoral research, and six other start-up companies that have been developed in the program. The first course in the program is business foundations for entrepreneurs, MGMT 5213, which is offered every spring semester. Students do not need to complete the certificate program to enroll in the class, which is designed to give non-business students a broad overview of business topics.

For more information, send an e-mail vickers@uark.edu or call 575-2875.

GRANT AWARD WINNERS

The following is a sampling of grants awarded to faculty in October, with the principal investigator, the award amount and the sponsor. An asterisk (*) indicates the continuation of a previous award.

- *Alan Mantooth, $1,665,727, Arkansas Science and Technology Authority
- Jia Di, $125,000, NASA
- Juan Carlos Balda, $53,001, University of Central Florida

Deadline Reminder from RSSP

The office of research and sponsored programs will not be open from Dec. 24 through Jan. 1 for the campus holiday break so any grant proposals due during that time are required to be finalized and into the office by Wednesday, Dec. 18.
For more information, contact the research and sponsored office at 575-3845.

CONTACT US

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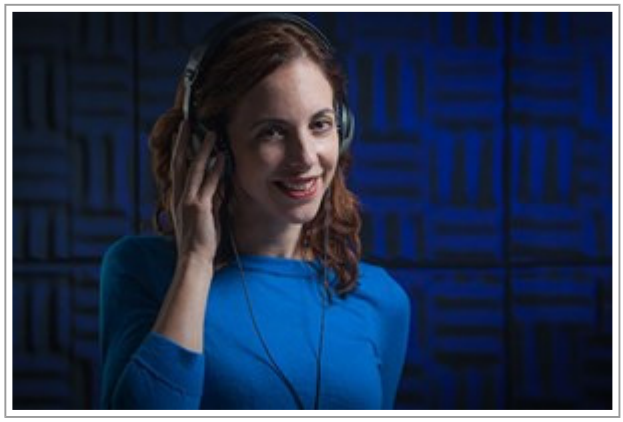
University of Arkansas Arkansas Newswire

Repetition in Music Pulls Us In and Pulls Us Together

Researcher publishes first in-depth study of musical repetitiveness

Tuesday, November 05, 2013



FAYETTEVILLE, Ark. – In *On Repeat: How Music Plays the Mind*, Elizabeth Hellmuth Margulis of the University of Arkansas explores the psychology of repetition in music, across time, style and cultures. Hers is the first in-depth study of repetitiveness in music, which she calls "at once entirely ordinary and entirely mysterious" and "so common as to seem almost invisible."

Repetition in music can be a motif repeated throughout a composition or a favorite song played again and again. It can be the annoying earworm burrowed into the brain that just won't go away.

Music, she writes, "is a fundamentally human capacity, present in all known cultures, and important to intellectual, emotional and social experience." And repetition is a key element in music, one that both pulls us into the experience and pulls us together as people.

In her research, Margulis drew on a range of disciplines, including music theory, psycholinguistics, neuroscience and cognitive psychology, to examine how listeners perceive and respond to repetition. She worked with ethnomusicologists to understand the place of music and its repetitive features in cultures around the world.

On Repeat is published by Oxford University Press. The Kindle version is available already, and the hardback publication will ship on Nov. 11, 2013.

A repeated musical motif can build pleasurable expectations in the listener, pulling them into the experience of the piece of music.

“Repetition makes it possible for us to experience a sense of expanded present, characterized not by the explicit knowledge that x will occur at time point y, but rather a déjà-vu-like sense of orientation and involvement,” Margulis writes.

Through repeated playing, a work of music develops an important social and biological role in creating cohesion between individuals and groups. Margulis points to children in nursery school singing a cleanup song each day or adults singing *Auld Lang Syne* at midnight on New Year’s Eve.

“Repeatability is how songs come to be the property of a group or a community instead of an individual,” she writes, “how they come to belong to a tradition, rather than to a moment.”

On Repeat offers new insights into the relationship between music and language, the nature of musical pleasure and the cognitive science of repetition in music. While the book will be useful to scholars and students, it is written for specialist and non-specialist alike.

Elizabeth Hellmuth Margulis is associate professor of music in the J. William Fulbright College of Arts and Sciences at the University of Arkansas.

The initial impetus for the book came in 2009 from an invitation to present a Distinguished Lecture on the Science and Technology of Music at the Centre for Interdisciplinary Research in Music, Media, and Technology at McGill University in Montreal, Canada.

Her research was supported by the music and psychology departments at the University of Arkansas. In 2011-2012, the Fulbright College made it possible for her to spend a year at Wolfson College and the Centre for Music and Science at the University of Cambridge. During the summer of 2011, she was a Fellow at the National Endowment for the Humanities Summer Institute on Ethnomusicology and Global Culture at Wesleyan University in Connecticut.

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