Celebrating Brain Science at the UA

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Four of the world's leading brain scholars will visit campus this week to help celebrate brain research at the UA.

The UA is a leader in brain science, and this year marks three significant campus milestones in the area: the 25th anniversary of the **Arizona Research Laboratories** [1] Division of Neural Systems, Memory and Aging; the 10th anniversary of the **McKnight Brain Institute** [2] and the fifth anniversary of the **School of Mind, Brain and Behavior** [3].

The University also recently announced the launch of the Center for Innovation in Brain Science, which will unite campuswide neuroscience efforts and provide training for the next generation of biomedical investigators. The center's mission aligns with the UA's **Never Settle** [4] strategic academic and business plan, which identifies neuroscience as one of the University's key research priorities.

To help commemorate these brain research milestones and kick off the new center, UA brain scientists **Lynn Nadel**, **Carol Barnes** and **Mary Peterson** invited four distinguished brain scholars to campus.

The guests, who will be on campus Thursday and Friday, include Eleanor Maguire, recipient of the Ig Nobel Prize for Medicine in 2003, and John O'Keefe and Edvard and May-Britt Moser, recipients of the Nobel Prize in Physiology or Medicine in 2014.

They will participate in a Brain Science Open Forum on Thursday at 11 a.m. at the Stevie Eller Dance Theatre and will give a scientific workshop to faculty and students on Friday.

UA researchers Nadel and Barnes both have ties to visiting Nobel laureate O'Keefe. Nadel and O'Keefe together wrote the book "The Hippocampus as a Cognitive Map" in 1978 and received the 2006 **Grawemeyer Award** [5] for their work in identifying the brain's mapping system. O'Keefe also was the post-doctorate mentor to Barnes.

In December, O'Keefe invited Nadel and Barnes to be his guests at the Nobel Prize ceremonies in Stockholm. O'Keefe and the Mosers shared the Nobel Prize in Physiology or Medicine for research that began in the laboratory Barnes shared with them more than 40 years ago.

To mark this week's celebration of brain science, Lo Que Pasa talked with Nadel and Barnes about the UA's work in the field, now and in the future.

Nadel is chair of the UA faculty and a Regents' Professor of Psychology and Cognitive Science. Barnes is a UA Regents' Professor of Psychology, Neurology and Neuroscience; director of the McKnight Brain Institute and Arizona Research Laboratories Division of Neural Systems, Memory and Aging; and associate director of the UA's **BIO5 Institute** [6].

How is the brain research being done at the UA making an impact on the national and international stage?

Barnes: We have a strong group of scientists at UA who are internationally recognized as having made important contributions to the fields of cognitive and systems neuroscience. Understanding how the brain is "wired" to store and retrieve daily experience is one of the grand challenges of our century – and fundamental for understanding "the mind."

Nadel: Our research on hippocampal function, aging and neural development has been recognized and made an impact at an international level.

How far have we come in unraveling the mysteries of the human brain?

Barnes: Remarkably far in the past century due to the development of brain measurement technologies including high density recordings of many brain cells, behavior-driven single cell imaging methods, new higher resolution whole brain imaging methods, and cognitive testing strategies that were unthinkable even a decade or two ago. UA scientists have contributed significantly to this effort.

Nadel: Amazingly far, but we are still very much at the beginning of deep understanding of the mysteries of how the brain gives rise to the mind.

Are we getting closer to finding a cure for Alzheimer's disease?

Barnes: We are getting closer to understanding the biological processes responsible for the disease – and to delaying the progression of the disease. A cure has still eluded us, but there are some extremely exciting new ideas for eradicating the disease that are under development now, which we will take advantage of as they become available to patients. Scientists in Arizona are among the most important thought leaders in this area – both with respect to creating definitions for normal versus pathological brain aging, and with respect to developing innovative therapies.

Nadel: Yes, but again, we are still very much at the start of understanding the complexities of the disease. So, more likely are advances that slow down the progression of the disease rather than cure it.

How significant is it to have these four scholars visit campus?

Barnes: This is the first Nobel Prize to have been awarded to cognitive and systems neuroscientists. The three laureates each have their primary degree in psychology. They have been mentors, colleagues and friends to several of us at UA – and it is thrilling to see this scientific approach be acknowledged as paradigm shifting. Many of us at UA share their vision that to understand how the brain functions in health or disease, we will have to decode the circuit maps of behavior – then we'll have a chance to produce effective treatments for disease prevention or reversal, or methods to optimize cognitive health across the lifespan.

Nadel: It's exciting for our students to see the people behind the prizes – and it is also an indication of the stature of the UA program in this area.

What's next for brain research at the UA?

Barnes: The BIO5 Institute and the UA Health Sciences Center have synergistic goals to support neuroscience research at UA in partnership with institutions across the state – from the molecular underpinnings of brain cell health, to the translation of this biological knowledge into treatments for neurological disease. The College of Science and the Office of Research and Discovery are also involved in supporting these efforts through the School of Mind, Brain and Behavior, the Division of Neural Systems, Memory and Aging, and the Evelyn F. McKnight Brain Institute. There are multiple ongoing interdisciplinary collaborations occurring across campus and the state that are on the forefront of solving the mysteries of brain function.

Nadel: The next exciting thing is the creation of a Center for Brain Innovation at the UA, centered in the Arizona Health Sciences Center while also building on strengths on main campus.
