

## Math at Work

Researchers test ways to curb nationwide college binge drinking

**I**N THE REALITY-INSPIRED TELEVISION show “Numb3rs,” mathematics is used to help the FBI solve crimes.

Could math also be used to help curb binge drinking by college students across the country?

The National Institute of Alcohol Abuse and Alcoholism believes it might. It has awarded a group of researchers

and public health officials to use in their ongoing fight against student binge drinking, he said.

Until he became involved with this project, Ackleh had never given the topic much thought. “I had no clue about the severity of binge drinking by college students nationwide,” he said.

Recent studies show that 40-45

drinks in the same time period – because women’s bodies react differently to alcohol.

College binge drinking is complex. Factors that can affect students’ alcohol consumption include access, the cost of alcoholic beverages and perceptions of peers’ drinking habits.

College students’ alcohol consumption is big business.

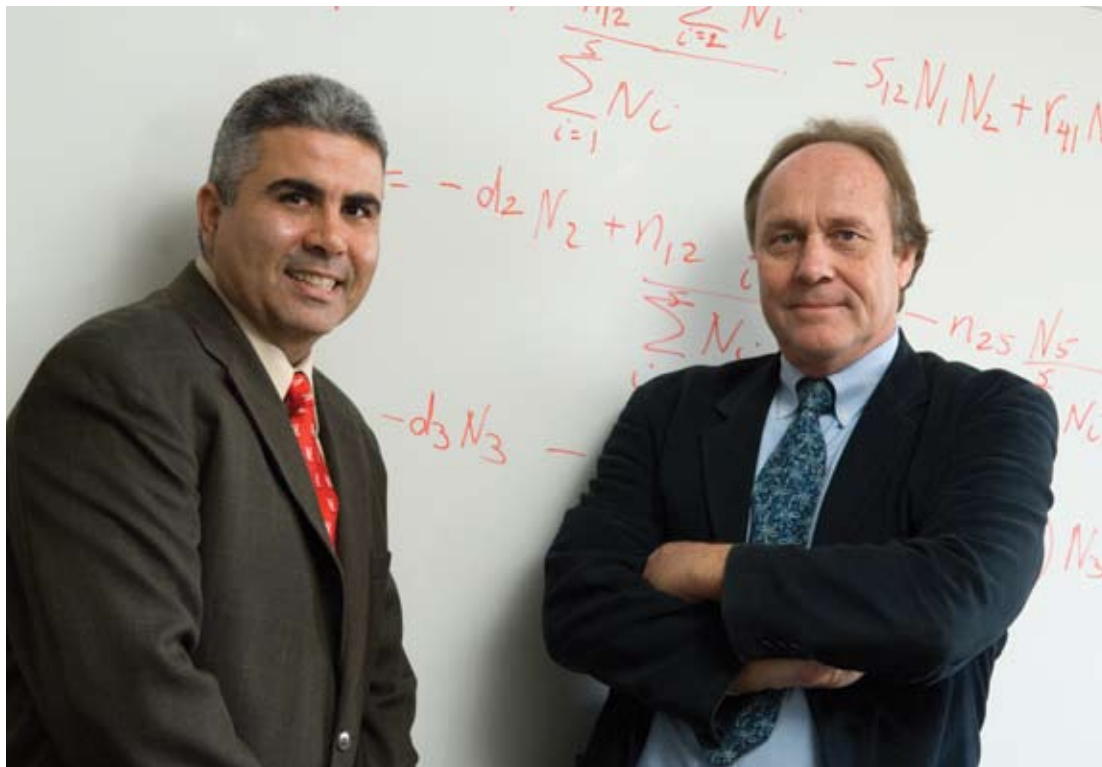
According to the Harvard School of Public Health, “College students currently spend \$5.5 billion a year on alcohol, more than they spend on textbooks, soft drinks, tea, milk, juice and coffee combined.”

But what does math have to do with binge drinking?

Ackleh explained that mathematical models are “approximations” of reality that have been used successfully for many years to test theories.

“Much of new technology begins with models that are tested on the computer before

they’re actually tested in the real world,” he said. “Mathematical modeling techniques are viewed as valid and useful, primarily because their resultant predictive power has been demonstrated time and time again in physics and engineering. Mathematical modeling is also valuable because of the enhanced understanding of the underlying



Dr. Azmy Ackleh and Dr. Richard Scribner

and software experts with more than \$1 million over four years to answer that question.

Dr. Azmy Ackleh, a UL Lafayette professor of mathematics, is one of those researchers. So far, their study has shown that math – more specifically, mathematical modeling – is a promising weapon for higher educa-

tion and public health officials to use in their ongoing fight against student binge drinking, he said. About 1,700 U.S. college students between the ages of 18 and 24 die from alcohol-related causes each year, according to the NIAAA.

Binge drinking is generally defined for males as consuming five alcoholic drinks in four hours or less. The amount is slightly less for females – four

TRAVIS GAUTHER

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**DR. AZMY ACKLEH**

mechanisms that can be revealed during the modeling process.”

The professor said binge drinking represents a significant public problem “that has not been amenable to preventive interventions targeting individuals. However, there is evidence that comprehensive community interventions – specifically those that target the campus alcohol availability environment – may be successful in addressing the problem.”

So, Ackleh and others in his group are using mathematical modeling to test policies related to alcohol consumption by college students.

For example, if a city council were to enact an ordinance prohibiting new businesses from selling alcohol within a mile of a university campus, would that affect college students’ drinking patterns?

The mathematician noted that public health policies and programs can be powerful catalysts for behavioral changes. For instance, a 1964 Surgeon General’s Report showed a link between smoking and lung cancer. A variety of subsequent measures, including smoking bans in public places, have cut the adult smoking rate in half in the United States.

Mathematical models can help university leaders and public officials by “taking the emotion out” of policy decisions, Ackleh explained. “The evidence must be there before a person is willing to implement policies. We’re just trying to boost the amount of evidence.”

In the case of binge drinking, mathematical models are more beneficial than traditional data models, according to Ackleh.

“Our current understanding of college drinking is based on models of data, which are developed to fit a particular data set and provide insights into one process or another. Such models are of less use to policy makers faced with environmental

change strategies that will ultimately affect the delicate political and social balance that exists at any college campus.”

Ackleh became involved in binge drinking research when he was contacted by Dr. Ben Fitzpatrick, a mathematics professor at Loyola Marymount University in Los Angeles. Ackleh and Fitzpatrick have collaborated on other projects.

Fitzpatrick was attending a seminar hosted by the NIAAA to bring mathematicians and public health researchers together to discuss ways to develop models

## QUICK FACTS

- About 1,700 students are killed in alcohol-related accidents each year.
- About 600,000 students between the ages of 18 and 24 are unintentionally injured while under the influence of alcohol.
- Binge drinkers have more alcohol-related problems than social drinkers, such as hangovers or missing classes.
- Although the number of abstainers has increased in recent years, the number of binge drinkers has remained the same since the early 1990s.
- Ninety percent of all campus violence is alcohol related.

*Sources: National Institute of Alcohol Abuse and Alcoholism, New York Times Co.*

of drinking behavior. There, he met Dr. Richard Scribner of the Louisiana State University Health Sciences Center School of Public Health in New Orleans.

Scribner, who earned a medical degree from the University of Southern California School of Medicine, has published several papers about alcohol-related topics. “As a physician in practice, I was struck by the

volume of patients coming through Los Angeles County Hospital that were there due to drinking-related problems – everything from acute injuries to chronic liver disease,” he told *La Louisiane*. “Yet all we would do was patch them up to go out and drink again. We did nothing for their underlying problem, which was drinking. Consequently, prevention is really the only way to truly address this problem.”

Fitzpatrick and Scribner began to talk about ways mathematical models could be used to address binge drinking by college students. Fitzpatrick suggested tapping Ackleh’s expertise.

Ultimately the team would include Geoffrey Jacquez, president of Biomedware Corporation in Ann Arbor, Mich., and Robert Rommel, a software engineer at Biomedware. That company is developing user-friendly software based on the researchers’ mathematical model. Other team members are Jeremy J. Thibodeaux, a UL Lafayette graduate student, and Neal Simonsen, an assistant professor at LSU’s School of Public Health in New Orleans.

Once the NIAAA grant was secured, the team started developing a mathematical model.

Ackleh said they quickly realized that a college’s student population is ideally suited to mathematical modeling, for several reasons. It’s a relatively “closed” or homogenous society, for example. Most students attend a university for a defined period of time. Also, a large amount of pertinent data, such as graduation and dropout rates, is easily available.

The researchers established five categories of college drinkers, ranging from those who abstain to those who drink heavily. Using their mathematical model, they could inexpensively test the outcome of policies, “without affecting people’s lives,” Ackleh said. The model also enabled them to predict outcomes over a period of time.

The NIAAA is an arm of the venerable National Institutes of Health.

Ackleh said the funding source is significant because it’s a measure of the research project’s merit. “Federal agencies require you to be very competitive. When you get federal funding, it means your ideas are nationally innovative.” ■

 [www.niaaa.nih.gov](http://www.niaaa.nih.gov)  
[www.collegedrinkingprevention.gov](http://www.collegedrinkingprevention.gov)

## University does more to help local, state economies

THE UNIVERSITY OF LOUISIANA AT Lafayette is beefing up its efforts to take technology to the marketplace.

“The university’s goal with technology transfer is to stimulate economic development from the local level to the state level,” said UL Lafayette President Ray Authement. “Our priority is to assist businesses within our community and state while enhancing the reputation and impact of the university.”

UL Lafayette plans to reach its goal by promoting the development of intellectual properties – such as inventions, discoveries or works of authorship – on campus.

The university holds 19 registered copyrights, five license agreements and three patents. Ten patents are pending. University administrators want to increase those numbers.

Dr. Ramesh Kolluru will spearhead the effort. He was recently named assistant to UL Lafayette’s vice president for Research and Graduate Studies. He remains director of the Center for Business and Information Technologies.

“Ramesh is already doing this on a smaller scale at CBIT. He will now be a liaison working with the university community as a whole,” said Dr. Bob Stewart, vice president for Research and Graduate Studies.

Kolluru said he expects intellectual property numbers to rise with the recent opening of the Louisiana Immersive Technologies Enterprise and its connection to

the Louisiana Optic Network Initiative.

LITE is a research complex featuring a comprehensive set of advanced visualization systems, including the world’s largest 3-D theater and one of the world’s first six-sided digital 3-D immersive rooms. (See related story, page 28.) It is powered by a highly integrated concentration of graphics supercomputer-class servers and high-speed networking.

LONI is a fiber optics network that connects supercomputers at Louisiana’s major research universities. By combining resources, researchers can take advantage of computation speeds of more than 1,000 times the rate previously possible.

“I think it is a great time for the university to tap into the energy and excitement from assets like the LITE facility and LONI,” Kolluru said.

UL Lafayette has established the Louisiana Technology Incubator for

Entrepreneurial Success, or LA TIES, to capitalize on that energy. Funded by a National Science Foundation grant, it will help the university create the next generation of technology products and services.


In addition to creating Kolluru’s position, the university’s web site has also been enhanced to feature more information and resources related to intellectual properties. It now provides forms necessary to register intellectual properties, along with policies and helpful information about technology transfer.

“The web site contains everything a faculty member or researcher needs to understand intellectual properties and procedures. It’s a one-stop shop for registering their information or learning more about the process of registering intellectual properties,” Stewart said.



Dr. Ramesh Kolluru

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 <http://research.louisiana.edu>

### CAN COMPUTER CHIP SYSTEMS LEARN TO ALL GET ALONG?

SOME UL LAFAYETTE computer scientists are exploring ways to make different technologies work together on incredibly tiny computer chips.

“Nanotechnology enables you to have more than one technology within the same chip,”

said Dr. Magdy Bayoumi, director of the Center for Advanced Computer Studies and head of the Computer Science Department. “So, you can have the standard microelectronics, but you can



An example of a MEMS component

also have microelectromechanical parts, or MEMS. To make these two technologies in the same package, or to interface them, is a big problem.”

But once researchers solve that problem, the ability to have compatible technologies in the same chip will have far-reaching applications in the auto industry, sensor applications and military weapons.

The National Science Foundation has provided \$300,000 to develop a

laboratory and facilities for nanotechnology in the new computer science building that is expected to open in a couple of months.

“The funding will enable us to do serious work in nanotechnology,” Bayoumi said.

He is the principal investigator of the project. The other investigators are Dr. Soumik Gosh, Dr. Mohamed Shaheen and Dr. Ashok Kumar, who are all research scientists at CACS, and Dr. Mohammad R. Madani, an associate professor of electrical engineering and computer engineering.