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# Statisticians listen and give a voice to data

Data can be used in many different ways and to answer many different questions. One statistician believes that in order to successfully use data, you must first be willing to “listen” to it.

“I’m going to listen to the data,” said Andy Bartlett, assistant professor in the department of mathematics and statistics at Southern Illinois University Edwardsville. “I want to sit back, look at the data, do the analysis and see what it says. You’ve got to put your ear close to it and see what it tells you.”

Bartlett’s objective view of statistics is especially relevant since his research works to find answers to questions that are frequently subject to bias: Do global warming and climate change exist? He studies statistical models that focus on extreme values, not on traditional descriptive statistics like the mean or median that describe a typical experience.

“We all recognize these extremes,” he said. “However, when you do analysis most people just want to use the average as an estimate. But you don’t feel a little shift in

### Adam Weyhaupt College Talk

the average from one month to the next. What you detect is extreme events – spikes if you will – like those days we all talk about when the temperature is 120 or negative 20 degrees.”

He said that he tries to see if you can detect a change in the climate based on how frequently these extreme events occur. This is a relatively new approach since most techniques rely on so-called central estimators like the average temperatures.

“We set a threshold of what is extreme and see how many times that happens, and then use those observations to come up with estimates for whether there has been as significant change,” he explained. Because of this innovative approach, Bartlett was recently awarded the Henry and Annette Baich Award for his project, “Detecting Change-Points Using Extreme Values in a Changing

Climate.”

Bartlett, who has a Ph.D. from the University of Georgia, said he was drawn to statistics in college because he was frustrated by “cookbook” style problems shown to him in his college statistics class. He continued to study mathematics and later was attracted to the ability to apply statistics to real-life problems. He said that he views one key role of a statistician as separating meaningful observations from noise in a large mess of data.

“What is nature telling us? What do we observe?” he asks in his research. “Statistics is a scientific field. Using mathematics does just that. Statistics lets us play in different fields with data from chemistry, physics, nursing, biology and engineering. We get to look at something different from time to time.”

The role of computers in statistics is two-fold. On one hand, companies and governments can use computers to collect and store massive amounts of data. Computers are also used to calculate various statistical models and measures. The statistician then takes on an

important role.

“Their job is to interpret what those results are saying,” Bartlett explained. “You don’t just say the p value is 0.12. It is the context and meaning that is important. You have to explain what the p value is measuring. We want to be the voice of the data. We listen to it and then we translate for it.” Bartlett describes statistics research as being tightly linked to teaching.

“In statistics, it’s all about recognizing patterns,” he said. “We start out with a small set of tools in our toolbox, of patterns that we know. The further we go on, we have to take these concrete examples to abstract ideas.” In this way, research is like teaching. Bartlett spoke about how in both research and teaching, you have to build new concepts from familiar ideas.

“I recognize this problem,” he said. “But now I have a new problem. How can we adjust by applying some fundamental mathematical tools?”

Bartlett’s passion really comes through when talking about his

teaching. Since he was frustrated as a college student by book problems that didn’t reflect the complexities of real-life, he now tries to show his own students an interdisciplinary perspective with a focus on applications.

“I like to make it fun,” he said. “I’ll show them examples that relate to their majors. So when I’m talking to engineers I’ll do an example about failure of a component. If I’m talking to biology students, we’ll use an example that relates to them.”

One of the hardest parts about teaching statistics, Bartlett said, is that many students are turned off by the very idea. He said he thinks part of the reason is that students don’t have exposure to statistics throughout the public school curriculum.

“Statistics doesn’t really get into the K-12 school system,” he said. “Students know math, English, history, but they come to college and haven’t seen a stats course and get intimidated, scared.”

But since the world is now collecting more data than ever, sta-



**Dr. Andy Bartlett**

istics is more central to business, industry and government than ever before. Bartlett thinks that statisticians can and must have a positive impact on the school curriculum.

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