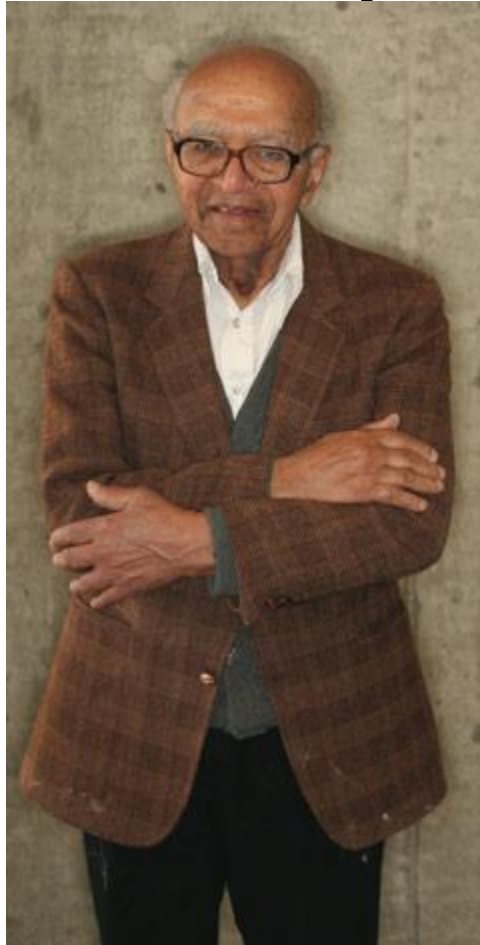


## David Blackwell, 'Superstar'



**David Blackwell**

*By Daniel Cattau*

By the start of World War II, **Joseph Doob**, HON '81, a renowned mathematician at the University of Illinois, already had pioneered work in modern probability theory.

In the next decades, Doob's foundational work would help broaden the field of mathematics to a dizzying array of uses in science, economics and technology. So it came as no surprise when in 1942, Jerzy Neyman of the University of California at Berkeley asked if Doob were interested in going West.

"No, I cannot come, but I have some good students, and Blackwell is the best," he replied.

"But of course he's black," Doob continued, "and in spite of the fact that we are in a war that's advancing the cause of democracy, it may not have spread throughout our own land."

The quote, repeated in the book "Mathematical People," says a lot about the times and even more about **David H. Blackwell** '38 LAS, AM '39 LAS, PHD '41 LAS, HON '66, who started as an Illinois undergraduate in 1935 and finished with a doctoral degree six years later, all accomplished at a time when residence halls were whites-only, and approximately 100 blacks were included in the student body of nearly 12,000.

What would be the odds of the son of a railroad worker from Centralia – whose parents did not complete high school and whose Depression-era teaching prospects were limited to segregated schools – becoming one of the top theoretical mathematicians (black or white) in the world?

Almost too hard to compute.

## **HELPING HANDS**

Growing up in a town of 12,000 people, Blackwell was surrounded by a close-knit family.

The oldest of four children, he appeared to be precocious at an early age. Able to read before entering one of the five mixed-race schools in town, he attributed his ability to the time he spent at a grocery and dry goods store owned by relatives.

“There would be a package of seeds for a pumpkin, and there would be a picture with the word ‘PUMPKIN,’” said Blackwell. “That’s how I learned to read.”

While he showed an early aptitude for reading, he didn’t display much interest in math. At Centralia High School, Blackwell remained unimpressed by algebra or trigonometry and thought calculus might be useful (for engineers). But then geometry teacher Caroline Luther opened his eyes to the “helping line.” “It was just beautiful, and some of it was unexpected,” he said. The concept, often called “elegant” mathematics, adds seemingly irrelevant lines which end up clarifying a problem, thereby turning “something mysterious into something obvious,” he said.

And in just that way, Blackwell’s lifelong romance with mathematics began.

## **MODEST AMBITIONS**

When a 16-year-old Blackwell arrived at Illinois in 1935, he was “not very ambitious,” but thought he might become an elementary school teacher or perhaps a high school math teacher.

“My father had a friend who was on the school board in a county on the extreme end of southern Illinois,” said Blackwell. “He said he could get me a job teaching in a black school. ... that settled it.”

As it turned out, his aspirations were far too modest. Much to his surprise, Blackwell was encouraged by his professors to continue his graduate studies, and he did so under Doob.

“You could either get a fellowship or a teaching assistantship,” said Blackwell of his search for financial support. “One of my fellow graduate students told me, ‘You’re going to get a fellowship.’”

“How do you know?” Blackwell asked.

“You’re good enough to be supported one way or another,” the fellow student replied, “and they’re certainly not going to put you in front of a classroom.”

After earning a UI doctoral degree in mathematics in 1941 at the age of 22, Blackwell completed a year at the Institute for Advanced Study in Princeton, N.J., where he worked with, among others, John von Neumann, father of modern game theory.

Berkeley’s Jerzy Neyman – who had been unable to persuade Doob to join his department – wanted to offer Blackwell a position but appeared to have come up against a deal-breaker.

In an oral history interview at Berkeley, Blackwell, now 90 years old and in “fair” health, recalled what he learned years later – that the Texan wife of the department head told her husband she “was not going to have that darky in her house.”

The job offer never came.

Blackwell focused his efforts instead on realistic career aspirations for a person of color at the time. In 1942 he applied to 105 historically black colleges, received three offers and eventually landed at Howard University in Washington, D.C., in 1944, where he remained for 10 years.

It was at Howard and during his summers at the RAND Corp. that Blackwell met statistician Abe Girschick, with whom he co-authored the classic “Theory of Games and Statistical Decisions,” and Jimmie Savage, who helped Blackwell’s career and reputation to blossom via the work they did in game theory.

And while that may sound like, well, fun and games, game theory is a serious business that determines mathematical bases for making decisions in games and/or conflict situations involving two or more persons. The theory may be applied to transactions ranging from simple rounds of “rock, paper, scissors” to the infinitely more complex zero-sum nuclear arms race.

“People who study games know who David Blackwell is,” said UI statistics professor Stephen Portnoy.

### **‘YOU SEE SOMETHING NEW’**

Back at Berkeley, Neyman had never forgotten Blackwell and finally hired him in 1954, where he would stay for the remainder of his career.

It’s been said that by the age of 40, Blackwell had accomplished what mathematicians would consider a lifetime’s work. “He’s highly intelligent, very sensitive and introspective in the way he processes information and keeps it inside him,” said Richard Tapia of Rice University. “But it’s easy to talk about a superstar.”

Blackwell was one of the first researchers to introduce into the field of statistics game theory and decision theory, ideas whose mathematical concepts can apply directly to real-world problems (for example, decision theory can be used by industrial managers to solve problems like scheduling, safety and maintenance). He founded the theory of the comparison of experiments, which eventually became a key tenet of mathematical statistics.

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**“I have often thought of how different America could be if we could produce more David Blackwells.”**

**– Freeman A. Hrabowski III**

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In addition, Blackwell published numerous papers, despite teaching 12 hours, serving as department chairman and supervising dozens of graduate students. (Plus, he and his late wife of 62 years, Ann, an accomplished jazz pianist, had eight children.) He developed a reputation as a dynamic lecturer and teacher, an observation with which Douglas Simpson, chairman of the statistics department at Illinois, concurs. “Professor Blackwell is ... known as a lucid and eloquent public speaker,” Simpson said, “with a gift for explaining mathematical ideas to a broad audience.”

Donald L. Burkholder, a UI professor emeritus of mathematics, got to know Blackwell during a sabbatical at Berkeley in the early 1960s.

“[He] is a very interesting and very pleasant person,” Burkholder recalled. “If you had an office and you had to share it with someone, it would be Blackwell.”

Perhaps that’s because unlike some other mathematicians whom Burkholder describes as aloof and arrogant, Blackwell is “dignified ... [and] doesn’t try to exalt himself,” Burkholder said.

Nor does Blackwell mind spreading the wealth of mathematical insight around. “[If] I have a problem and I’ve worked on it, I can’t solve it, I keep telling other people about it,” he said. “I guess that’s another example of my bugging other people with problems.

“I like mathematics. It’s beautiful,” Blackwell said. (Note: When this reporter confessed his highest math course had been high school calculus, Blackwell replied with “poor fellow,” sincerely sorry that the writer had lost so many opportunities to enjoy the delights of the world of math.)

“I like understanding things and explaining them,” he said. “And sometimes when you’re trying to understand something, you see something new, and they call that research.”

He also allows a broad perspective in evaluating people and their talents. According to Berkeley’s oral history, Blackwell eschewed the traditional forms of review when a certain graduate student wasn’t doing well.

While he knew little about the student’s studies, Blackwell placed a vote of confidence in him. His reason? In Blackwell’s opinion, the student “was far and away the best Kriegspiel player in the department.”

If you can’t add numbers in your head, you probably wouldn’t be good at Kriegspiel – also called blind chess – which involves one referee, two players and three chess boards. In the game, a player makes a move without knowing the position of the opponent’s pieces. The referee rules whether the move is permitted, with the player making another one if the original is disallowed.

“And on the basis of my recommendation – made because of [the grad student’s] Kriegspiel – he was kept on for another year,” Blackwell said.

## **HONORS AND ACCOLADES**

Blackwell’s efforts haven’t gone unnoticed. He was the first black tenured faculty member at Berkeley and in 1965 became the first black elected to the National Academy of Sciences. In addition, several theorems have been named after him.

In 1979 Blackwell was awarded the John von Neumann Theory Prize for his “many contributions in probability theory, mathematical statistics, and game theory that have strengthened the methodology of operations research and management science” and in particular for developing the theory of Markovian decision processes.

Impressed? The previous year’s winners were John Nash (the schizophrenic professor portrayed by actor Russell Crowe in the 2001 film “A Beautiful Mind”) and Carlton Lemke for their work on noncooperative games.

Blackwell can count among his many accolades some of the most prestigious professional prizes and honorary doctorates from, among others, Harvard, Amherst, Yale and Carnegie Mellon. In 1994, the University of Illinois Alumni Achievement Award was bestowed on him by the UI Alumni Association. Yet in the oral history project at Berkeley, when asked what awards meant the most to him, he replied simply:

“Yes, there were two honors that I’m really proud of. One was my honorary degree from the University of Illinois [1966]. And the other was my honorary degree from Howard University. ... I was at the University of Illinois for six years. And I was at Howard University for 10 years. So, when you get an honorary degree from a place where the people really know you, that’s something to be pleased with, I think.”

### ‘GENTLE GIANT’

Blackwell’s influence in the field of mathematics reaches far beyond the classroom walls.

University of Michigan math professor **Robert E. Megginson** ’69 LAS, AM ’83 LAS, PHD ’84 LAS, described Blackwell as a “gentle giant ... always helpful to anyone who can benefit from his attention and thoughts, whether it is an eminent mathematical colleague or a beginning student.”

He and Megginson, an American Indian, have often discussed the small number of minorities in mathematics (according to 2007 figures, doctoral-degreed black faculty members in math or statistics in four-year colleges number 3 percent or less).

Blackwell’s dedication to expanding opportunities for minorities in those fields was acknowledged in 2002, when the Blackwell-Tapia Prize was established and named for him and Richard Tapia, the Rice University professor who is the son of Mexican immigrants. The award honors those who have served as role models for minority students or who have addressed the issue of having few minorities in the field.

For Blackwell and many others, the number of minority students remains a concern.

“When I entered graduate school in mathematics at the University of Illinois in 1970, I was astounded to learn that an African-American had actually studied there as an undergraduate and graduate student more than 30 years before,” said **Freeman A. Hrabowski III**, AM ’71 LAS, PHD ’75 ED, HON ’04, president of the University of Maryland, Baltimore County, and a crusader for closing race and gender gaps in math and science.

“I have used his name many times over the years when encouraging students to consider mathematics as a career,” he said, “and I have often thought of how different America could be if we could produce more David Blackwells.”

*Cattau, a former lecturer at the UI College of Media, is a writer in Chicago.*