## News from the AMS

# Judea Pearl to Receive Inaugural Ulf Grenander Prize in Stochastic Theory and Modeling

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(/images/Grenander-2018-Pearl-Photo.jpg) Judea Pearl will receive the 2018 Ulf Grenander Prize in Stochastic Theory and Modeling for the invention of a model-based approach to probabilistic and causal reasoning, for the discovery of innovative tools

for inferring these models from observations, and for the development of novel computational methods for the practical applications of these models. (Photo: UCLA Engineering.)

Ulf Grenander sought to develop general tools for constructing realistic models of patterns in natural and man-made systems. He believed in the power of rigorous mathematics and abstraction for the analysis of complex models, statistical theory for efficient model inference, and the importance of computation for bridging theory and practice. Judea Pearl has relied on these very same principles, bringing to it an energy and creativity that is remarkably reminiscent of the scientific life of Ulf Grenander.

Pearl has had a sweeping impact on the theory and practice of statistics and machine learning, and his ideas continue to engage mathematicians, statisticians, and many other scientists with challenging analytic and algorithmic problems that are at the heart of modern AI.

### Biographical Sketch of Judea Pearl:

Judea Pearl is professor of computer science and statistics at UCLA, where he currently directs the Cognitive Systems Laboratory and conducts research in artificial intelligence, human cognition, and philosophy of science.

He has authored numerous scientific papers and three books, *Heuristics* (1983), *Probabilistic Reasoning* (1988) and *Causality* (2000, 2009), which won of the London School of Economics Lakatos Award in 2002. A recent book, *Causal Inference in Statistics* (2016, with M. Glymour and N. Jewell) introduces modern causal analysis to undergraduate statistics education. His forthcoming *The Book of Why* (2018, with Dana Mackenzie) explains for a general audience how the concept of cause and effect, the grand taboo in science, can be placed on a firm mathematical foundation.

Pearl is a member of the National Academy of Sciences and the National Academy of Engineering, a fellow of the Cognitive Science Society and a founding fellow of the Association for the Advancement of Artificial Intelligence. He is a recipient of the Technion's Harvey Prize (2011), and the ACM A.M. Turing Award (2012) for the development of a calculus for probabilistic and causal reasoning.

#### **Response from Judea Pearl:**

I am extremely honored to receive the Ulf Grenander Prize from the American Mathematical Society. The idea that my work in artificial intelligence has been noticed by mathematicians makes me view it from new perspectives, colored both by my passion for mathematics and by the universal challenges that mathematics poses to the human intellect.

I also view this prize in the context of a philosophical puzzle that has haunted me for many years: Why has science deprived cause-effect relationships from the benefit of mathematical analysis? My college professors could not write down an equation to express the most obvious causal statement. For example, that the rooster crow does not cause the sun to rise, or that the falling barometer does not cause the incoming storm. Unlike the rules of geometry, mechanics, optics, or probability, the rules of cause and effect have not been encoded in a mathematical framework. Why have scientists allowed these rules to languish in bare intuition, deprived of mathematical tools that have enabled other branches of science to flourish and mature?

My research in the past 25 years has attempted to rectify this historical neglect using graphs, instead of formulas, and to capture what the data we observe can tell us about causal forces in our world. The Ulf Grenander Prize tells me that these attempts have not been totally unnoticed. I hope therefore that this prize will further encourage mathematicians to delve into the intricate problems that the calculus of causation has opened and that this influx of interest will lead to new insights into the logic that governs human understanding.

#### Background of the Ulf Grenander Prize in Stochastic Theory and Modeling:

The Ulf Grenander Prize in Stochastic Theory and Modeling, awarded every three years, recognizes exceptional theoretical and applied contributions in stochastic theory and modeling. It is awarded for seminal work, theoretical or applied, in the areas of probabilistic modeling, statistical inference, or related computational algorithms, especially for the analysis of complex or high-dimensional systems. The prize was established in 2016 by colleagues of Ulf Grenander (1923-2016), who was an influential scholar in stochastic processes, abstract inference, and pattern theory.

The 2018 prize will be awarded Thursday, January 11, 2018, at the Joint Mathematics Meetings in San Diego.

Find out more about the Ulf Grenander Prize in Stochastic Theory and Modeling. (/pro-fession/prizes-awards/ams-prizes/grenander-prize)

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Founded in 1888 to further mathematical research and scholarship, the American Mathematical Society fulfills its mission through programs and services that promote mathematical research and its uses, strengthen mathematical education, and foster awareness and appreciation of mathematics and its connections to other disciplines and to everyday life.