# Book of Abstracts

Joel E. Cohen (Rockefeller University & Columbia University)
**Taylor's Law of Fluctuation Scaling**

A family of nonnegative random variables is said to obey Taylor's law when the variance is proportional to some power of the mean: variance = $a \times \text{mean}^b$. E.g., in the family of exponential distributions, when the mean is $\mu$, the variance is $\mu^2$, so $a = 1$, $b = 2$. The discrete-time Galton-Watson branching process, the continuous-time linear birth and death process, and other stochastic processes obey Taylor's law. Thousands of empirical illustrations of Taylor's law in many different sciences have been published since the discovery of Taylor's law by Chester Bliss in 1941 and the eponymous 1961 paper by L. Roy Taylor. Recently, we proved versions of Taylor's law for nonnegative stable laws with no finite moments, for higher moments, and for functions related to the variance such as the upper and lower semivariance. I will review some empirical and theoretical results. (Joint work with Mark Brown and Victor de la Peña.)

Jim Fill (The Johns Hopkins University)
**Multivariate Pareto Records**

Consider i.i.d. $d$-dimensional observations with independent coordinates, each with (say) the standard Exponential distribution. Say that the $n^{\text{th}}$ observation *sets a (Pareto) record* if it is not dominated by any of the first $n-1$ observations. If $1 \leq k \leq n$, say that the $k^{\text{th}}$ observation is a *current record* at time $n$ if it sets a record and is not dominated by any of the next $n-k$ observations; and say that the $n^{\text{th}}$ observation *breaks the record* set by the $k^{\text{th}}$ observation if the $k^{\text{th}}$ observation is a current record at time $n-1$ but not at time $n$.

We will discuss one or more of the following topics: (i) an efficient algorithm for the simulation of Pareto records, and its (partial) analysis; (ii) the location and thickness of the record frontier; (iii) how the Geometric(1/2) distribution arises in connection with the breaking of bivariate records. (Joint work with Daniel Q. Naiman)

Olympia Hadjiliadis (Hunter College, The City University of New York)
**Multidimensional Quickest Detection**

We consider the problem of quickest detection in the presence of multiple correlated random sources each driven by distinct sources of noise represented by a Brownian motion. We address the problem of detecting a change in the drift of correlated Brownian motions received in parallel at the sensors of decentralized systems. We examine the performance of one shot schemes in decentralized detection in the case of many sensors with respect to appropriate criteria. One shot schemes are schemes in which the sensors communicate with the fusion center only once; when they must signal a detection. The communication is clearly asynchronous and we consider the case that the fusion center employs the minimal strategy.

We prove asymptotic optimality of the above strategy not only in the case of independent sources of data but also in the presence of across-sensor correlations and specify the optimal threshold selection at the sensors. Moreover, we consider the problem of quickest detection of signals in a coupled system of $N$ sensors, which receive continuous sequential observations from the environment. It is assumed that the signals, which are modeled by a general Itô processes, are coupled across sensors, but that their onset times may differ from sensor to sensor. In this setup it is proved that the minimum of $N$ CUSUMs is asymptotically optimal as the mean time between false alarms increases without bound.

Erol A. Peköz (Boston University)
**Random Walk Generated from Random Permutations**

We give some results and a conjecture for a non-Markovian random walk generated from a random permutation, including cameo appearances by the Arcsin distribution and Stein?s Method. (Joint work in progress with Bhaswar Bhattacharya, Sourav Chatterjee, Persi Diaconis, Xiao Fang, Han Liang Gan, Haiyan Huang, Adrian Röllin, Wenpin Tang, and Jon Wellner)

Sheldon M. Ross (University of Southern California)
**Estimation of Team Strengths and Monotone Success Probabilities**

Supposing that each team in a league has a strength and that a team with strength $s$ will beat one with strength $t$ with probability $s/(s+t)$, we present a new way to use data to estimate team strengths as well as the probability that a given team has the largest strength. We also consider a problem in which an experiment can be run at one of the levels 1 through $n$, with the experiment success probability being an increasing function of its level. The success probabilities are assumed unknown and the problem is to determine the lowest level at which the success probability is at least some specified value. There is an experimental design phase, where decisions are sequentially made as to which level to try next and a decision phase where one estimates the success probabilities and determines the desired level.

Nozer Singpurwalla (City University of Hong Kong)
**Mark Brown, The Man, his Mathematics, and its Message**
*Presented by* Sheldon M. Ross (University of Southern California)

Mark Brown's resume lists at least 50 papers, most of them in some of the most highly ranked probability journals, like the Annals of Probability and its offshoots. This is an enviable record of accomplishment from a modest individual which humbles many, certainly myself. Many of these papers have a relevance to reliability theory. I will highlight some of these and point out their practical relevance to some currently active areas in risk analysis of engineered and biological systems and networks.

Christos H. Skiadas (ManLab, Technical University of Crete, Greece)

**The International Spread of the Brown–Proschan Model for Imperfect Repair**

The Brown–Proschan Model for Imperfect Repair has already covered a 35-year journey in the scientific literature. Further to considerable citations the model has received very strong credit for its clarity and flexibility allowing further development and application. It is stated as a standard model important for theoretical and applied studies. Included in the main books on reliability and maintenance has received a worldwide recognition. The model emerged from the need of large companies in USA to solve the repair problems of complicated machines or devices. They have invested in science to receive the best solutions in real-life problems. Accordingly, the Brown–Proschan model was adopted and applied from colleagues in Japan and China following the considerable growth of industrial applications in these countries. Similar works are also found in Europe where, we have focused on some doctoral dissertations and search for further development and publications and presentations in conferences and events.