Paper of the Month, March 2019: Woodroofe, M. (1977). Second order approximations for sequential point and interval estimation. Ann. Statist., 5, 984-995.

Many crucial properties associated with first boundary crossing depend intricately on the distribution of the corresponding stopping time, the magnitude of an overshot, and their complex relationship. Under a very broad structure and a minimal set of assumptions, Woodroofe (1977) developed nonlinear renewal theory to tackle these issues more generally than one would normally expect. In the same paper, Michael Woodroofe used his tools to precisely formulate second-order asymptotic approximations for the risk functions associated with a number of classical sequential point and interval estimation problems. The impact has been far reaching, helping researchers to investigate second-order approximations for risk functions in a very wide range of problems. Woodroofe's results are truly pretty, involve deep probability theory, and they are difficult to prove. On the other hand, their applications are numerous. Many have provided surprising practical and useful conclusions in a large variety of inference problems – parametric, nonparametric, multivariate tests and estimation. Frequentists and Bayesians (empirical, hierarchical) have both ripped well-deserved benefits from Woodroofe's techniques over the last four decades. I have been a direct beneficiary of Woodroofe's fundamental approach combined with the Lai-Siegmund (1977,1979, Annals of Statistics) approach over the past 40 years. My students, colleagues, I and others have taken those fundamentals with requisite updates as needed to many corners of statistical inference by handling problems in clinical trials, reliability, quality control, multiple comparisons, multiple decision theory and others. Woodroofe's 1977 paper continues to lay Golden Eggs without "stopping" (pun totally intended!).

Notes Preparer: Nitis Mukhopadhyay