



THE UNIVERSITY OF  
**CHICAGO**

Department of Statistics  
**STATISTICS COLLOQUIUM**

---

**MATTHEW STEPHENS**

Departments of Statistics and Human Genetics  
The University of Chicago

**False Discovery Rates—A New Deal**

**MONDAY, February 24, 2014 at 4:00 PM**

133 Eckhart Hall, 5734 S. University Avenue

*Refreshments following the seminar in Eckhart 110*

**ABSTRACT**

False Discovery Rate (FDR) methodology, first put forward by Benjamini and Hochberg, and further developed by many authors—including Storey, Tibshirani, and Efron—is now one of the most widely used statistical methods in genomics, among other areas of application. A typical workflow consists of i) estimating thousands of effects, and their associated  $p$  values; ii) feeding these  $p$  values to software (e.g. the widely used `qvalue` package) to estimate the FDR for any given significance threshold. In this talk we take a fresh look at this problem, and highlight two deficiencies of this standard pipeline that we believe could be improved. First, current methods, being based directly on  $p$  values (or  $z$  scores), fail to fully account for the fact that some measurements are more precise than others. Second, current methods assume that the least significant  $p$  values (those near 1) are all null—something that initially appears intuitive, but will not necessarily hold in practice. We suggest simple approaches to address both issues, and demonstrate the potential for these methods to increase the number of discoveries at a given FDR threshold. We also discuss the connection between this problem and shrinkage estimation, and problems involving sparsity more generally.

---

For further information and inquiries about building access for persons with disabilities, please contact Kirsten Wellman at 773.702.8333 or send her an email at [kwellman@galton.uchicago.edu](mailto:kwellman@galton.uchicago.edu). If you wish to subscribe to our email list, please visit the following website: <https://lists.uchicago.edu/web/arc/statseminars>.