



# THE UNIVERSITY OF CHICAGO

Department of Statistics

## MASTER'S THESIS PRESENTATION

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Rethinking the Markov Chain Approach to Optimizing a Baseball  
Batting Order

TUESDAY, February 13, 2018, at 10:00 AM  
Jones 304, 5747 S. Ellis Avenue

### ABSTRACT

Methods for optimizing runs generated from baseball batting orders have been studied since the 1970's. One such previously studied method is the Markov Chain approach, which caters to baseball's natural Markov Chain properties but not without limitation. The talk will focus on the creation of a simple 9-by-9 transition probability matrix (TPM) to predict leadoff hitters and total baserunners and a complex 121-by-121 TPM to predict an inning's run expectation given a specific leadoff hitter. The cross product of the leadoff probabilities and inning run expectations gives us the game (nine inning) run expectation, which we validate by way of various game simulations and optimize by running through all  $9!$  lineup permutations. The talk also discusses applications of the complex transition probability matrix and the usage of situational GLMMs to improve the run expectation accuracy.

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