Magic, Gandhi, and balding: matrix methods for stochastic dynamic programming

Abstract: What unites all of the things listed in this title? You'll have to show up to find out. This work is based on the concept of tradeoffs, a central idea in ecology and evolutionary biology. For example, the evolution of life history strategies is often framed in the language of tradeoffs. Behavioural ecologists may be interested in the tradeoffs inherent in the allocation of time (e.g., between foraging and vigilance) and resources (e.g., how much energy to invest in a reproductive attempt). Conservationists and wildlife managers must also consider tradeoffs between cost, political pressures, and management goals. Stochastic dynamic programming (SDP) is a powerful and flexible method for exploring optimal tradeoffs and has been used in a broad range of applications. In the last 30 years, concomitant with the development of SDP methods in ecology and evolution, matrix methods have emerged as another powerful tool for analyzing ecological systems. I will discuss how reformulating SDP problems in matrix notation allows us to propose a novel matrix method for solving SDP models, using intuition familiar to mathematical ecologists from matrix population models.

Short Bio: Jody Reimer is a postdoctoral researcher in mathematical ecology at the University of Utah. She tends to gravitate towards questions in cold places - with her PhD work focused on modelling the responses of Arctic marine mammals to changing sea ice conditions, and postdoctoral work centered on modelling the microbial environment within the sea ice itself. She holds a PhD in applied math from the University of Alberta, and a masters from the University of Oxford.