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Card shuffling, derangements, and q -analogues

How many times do you need to shuffle a deck of cards to ensure it is adequately mixed? This is a question in probability theory, but for many methods of card shuffling, the answer relies on combinatorics and representation theory. In this talk, I will discuss several classical card-shuffling processes and introduce their q -analogues, which can be understood as random walks on the (Type A) Hecke algebra. Motivated by questions of mixing times, I will present recent results and conjectures concerning the eigenvalues and eigenspaces of these (q -)shuffling operators. Along the way we will see derangements, desarrangements, and tableau combinatorics. This is joint work with Commins and Reiner, as well as Axelrod-Freed, Chiang, Commins and Lang.