SHUFFLING CARDS AND RANDOM MATRIX THEORY

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There is a surprising, useful connection between two classical topics in probability: The usual method for riffle shuffling cards (the Gilbert-Shannon-Reeds measure) connects to beautiful mathematics (Free Lie Algebra, representation of the infinite symmetric group, and symmetric function theory). This allows sharp answers to natural questions such as cycle structure, descent structure, length of longest increasing subsequence,.... Joint work with Jason Fulman has uncovered a non-limiting connection to the distribution of the eigenvalues of Wigner matrices. This gives new shuffling theorems and conversely. I will try to explain 'in English' as much as possible.