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Franco Saliola* (saliola.franco@uqam.ca). *A Hopf-algebraic approach to random-to-random shuffling operators.*

Pick a card—any card!—from the deck, and remove it; then put it back anywhere in the deck. Repeating this process leads to a card shuffling technique known as the random-to-random shuffle. An important open problem is to determine how many of these shuffles are needed to randomize a deck of cards. This is controlled by the spectra of these shuffles.

By considering all the random-to-random shuffles simultaneously, we prove that their eigenspaces admit a beautiful recursive structure. This structure allows one to build eigenbases starting from bases for the kernels. Among other things, this results in complete combinatorial descriptions of the eigenvalues.

This recursive structure also hints at an approach that uses the Hopf-algebraic formalism. We will present some successes and challenges in this direction and in studying similar shuffling operators.

Part of this talk is based on joint work with Ton Dieker. (Received August 11, 2015)