The crux of a card trick performed with a deck of cards usually depends on understanding how shuffles of the deck change the order of the cards. By understanding which permutations are possible, one knows if a given card may be brought into a certain position. The mathematics of shuffling a deck of 2n cards with two “perfect shuffles” was studied thoroughly by Diaconis, Graham and Kantor in 1983. I will report on our efforts to understand a generalisation of this problem, with a so-called “many handed dealer” shuffling kn cards by cutting into k piles with n cards in each pile and using k! possible shuffles.

A conjecture of Medvedoff and Morrison suggests that all possible permutations of the deck of cards are achieved, as long as k is not 4 and n is not a power of k. We confirm this conjecture for three doubly infinite families of integers, but the conjecture remains open. We initiate a more general study of shuffle groups, which admit an arbitrary subgroup of shuffles. This is joint work with Carmen Amarra and Luke Morgan.

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Cheryl Praeger has published more than 400 journal articles and five research monographs, many of them with her students (30 PhD students, 10 research masters students, 21 postdoctoral research associates) and research colleagues. She has played an active role supporting and mentoring young scientists, especially women.