Pascal's Arithmetic Triangle, Lattice Paths, and the Riordan Group

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Pascal's triangle when written in lower triangular form is an infinite lower-triangular matrix called a Riordan matrix. The set of all Riordan matrices forms a group under matrix multiplication. We use various properties of the group and Pascal's triangle to demonstrate numerous concepts that can be introduced in an elementary linear algebra course. Concepts covered in this talk involve matrix invertibility, similarity, and factorization, Stieltjes matrix representation, semi-circulant matrices, and Euler transform. We give a lattice path inerpretation of Pascal's triangle, and also introduce a generalized Pascal matrix.