

1056-G1-1528 **Jennifer Wilson*** (wilsonj@newschool.edu), Eugene Lang College, 65 W. 11th St., New York, NY, and **Karolyne Fogel, Kay Somers** and **Angela Spalsbury**. *Using Linear Algebra to Measure Power*.

There has been a lot of interest recently in mathematics applied to the social sciences and in mathematics and voting. In this talk we look at how linear algebra can be used to compute and analyze power in simple voting games. In simple voting games, players may vote yes or no and the rules of the game specify which combinations of voters are required for motions to pass. Applications include shareholders meetings where shareholders' votes may carry different weights and governing bodies such as the United Nations Security Council where different rules for permanent and temporary members determine when resolutions are passed. There are a number of well-known measures of power including the Shapley-Shubik power index and the Banzhaf measure. We look at how these and other indices of power can be expressed as linear combinations of vectors describing player's contributions to voting coalitions of different sizes. In the case of three voters, we show how the geometry of the simplex and the convex hull of these vectors can be used to show that all measurements of power must result in the same ranking of players' power. These ideas are easily accessible to undergraduates and highlight an interesting use of fundamental concepts in linear algebra. (Received September 22, 2009)