1090-05-320 **Kenneth W Johnson*** (kwj1@psu.edu). *Group schemes and fissions.* Preliminary report.

If a finite group G acts on itself by left and right multiplication a well known scheme is produced. Equivalently one can take a set of variables $\{x_g\}_{g\in G}$, form the group matrix $X_G = \{x_{gh^{-1}}\}$ and identify $x_g = x_h$ if g is conjugate to h. In probability theory X_G appears as the transition matrix X_G^p of a Markov chain which comes from a random walk on the group with probability distribution p, after x_g is replaced by $p(g)$. By the standard theory, if p is constant on conjugacy classes X_G^p can be diagonalised, and this simplifies the analysis.

The question which will be addressed is the following. Let R be an equivalence relation on G, and set $x_g = x_h$ iff gRh, giving rise to the matrix X_G^R. Under what conditions is X_G^R diagonalisable and in this case what is an upper bound for the number of classes of R? If R is finer than conjugacy, this is equivalent to the corresponding fission of the association scheme being commutative. In the probability context, the answer gives a weaker condition for p such that X_G^p can be diagonalised. There are obvious generalisations. (Received March 04, 2013)